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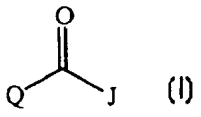
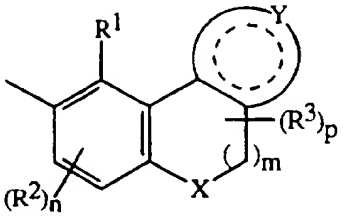


(I)



(II)

(57) Abstract

Compounds of Formula (I), and their *N*-oxides and agriculturally-suitable salts, are disclosed which are useful for controlling undesired vegetation, wherein J is Formula (II) and Q, X, Y, Z, R^1-R^{19}, m, n, p, q and r are as defined in the disclosure. Also disclosed are compositions containing the compound of Formula (I) and a method for controlling undesired vegetation which involves contacting the vegetation or its environment with an effective amount of a compound of Formula (I).

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TITLE

TRICYCLIC HERBICIDAL HETEROCYCLES

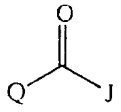
BACKGROUND OF THE INVENTION

This invention relates to certain tricyclic heterocycles, their *N*-oxides, agriculturally-suitable salts and compositions, and methods of their use for controlling undesirable vegetation.

The control of undesired vegetation is extremely important in achieving high crop efficiency. Achievement of selective control of the growth of weeds especially in such useful crops as rice, soybean, sugar beet, corn (maize), potato, wheat, barley, tomato and plantation crops, among others, is very desirable. Unchecked weed growth in such useful crops can cause significant reduction in productivity and thereby result in increased costs to the consumers. The control of undesired vegetation in noncrop areas is also important. Many products are commercially available for these purposes, but the need continues for new compounds which are more effective, less costly and environmentally safe.

SUMMARY OF THE INVENTION

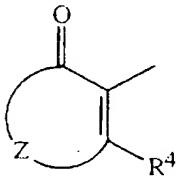
This invention is directed to compounds of Formula I including all geometric and stereoisomers, *N*-oxides, and agriculturally suitable salts thereof, agricultural compositions containing them and their use for controlling undesirable vegetation:



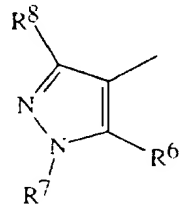
I

wherein

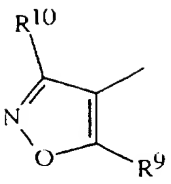
Q is



Q-1

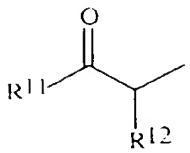


Q-2



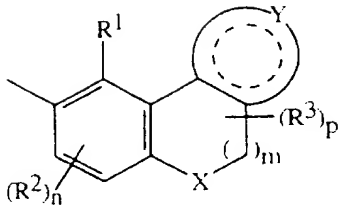
Q-3

or



Q-4

J is



X is O, $S(O)_r$, $N(C_1$-C_2 alkyl) or CH_2 optionally substituted with 1-2 C_1-C_2 alkyl;

Y together with the carbons to which it is attached form a phenyl ring or a fused five or six-membered heterocyclic ring, which may be fully aromatic or partially or fully saturated, containing 1 to 3 heteroatoms independently selected from the group nitrogen, oxygen, and sulfur, provided that the heterocyclic ring contains no more than 2 oxygens and no more than 2 sulfurs, and the ring is optionally substituted with one to three groups independently selected from the group C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2-C_4 dialkylaminosulfonyl, $NR^{15}R^{16}$, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylcarbonyl, halogen, cyano, nitro, phenyl optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro, and pyridyl optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro, provided that when a nitrogen atom of the fused heterocyclic ring is substituted, then the nitrogen substituent is other than halogen;

Z is selected from the group $-CH_2CH_2CH_2-$, $-OCH_2CH_2-$, -O-CH=CH-, $-NR^{13}CH_2CH_2-$, $-NR^{13}CH=CH-$, $-N=CHCH_2-$, $-OCH_2O-$, $-NR^{13}CH_2NR^{13}-$, $-N=CHNR^{13}-$, $-CH_2OCH_2-$, $-CH_2NR^{13}CH_2-$, $-CH_2S(O)_tCH_2-$, $-CH_2C(O)CH_2-$, $-CH=NCH_2-$, $-CH_2CH_2-$, $-OCH_2-$, $-SCH_2-$, and $-NR^{13}CH_2-$, each group optionally substituted with one to four R^5, and the directionality of the Z linkage is defined such that the moiety

depicted on the left side of the linkage is bonded to the carbonyl carbon of Q-1;

R^1 and R^2 are independently H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2–C_4 dialkylaminosulfonyl, halogen, cyano or nitro;

each R^3 is C_1-C_2 alkyl;

R^4 is OR^{14}, SH, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, halogen or $NR^{15}R^{16}$; or R^4 is phenylthio, phenylsulfonyl or -$SCH_2C(O)Ph$, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro;

each R^5 is independently H, C_1-C_3 alkyl, C_3-C_6 alkenyl, C_3-C_6 alkynyl, C_1-C_3 alkoxy, formyl, C_2-C_6 alkoxycarbonyl, -$CH(C_1$-C_3 alkoxy$)_2$, C_1-C_3 alkylthio, C_2-C_4 alkylthioalkyl, cyano or halogen; or when two R^5 are attached to the same carbon atom, then said R^5 pair can be taken together to form -OCH_2CH_2O-, -$OCH_2CH_2CH_2O$-, -SCH_2CH_2S- or -$SCH_2CH_2CH_2S$-, each group optionally substituted with 1-4 CH_3;

R^6 is OR^{14}, SH, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, halogen or $NR^{15}R^{16}$; or R^4 is phenylthio, phenylsulfonyl or -$SCH_2C(O)Ph$, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro;

R^7 is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6 alkenyl, C_3-C_6 alkynyl or -$CH_2CH_2OR^{13}$; or R^7 is phenyl or benzyl, each optionally substituted on the phenyl ring with C_1-C_3 alkyl, halogen, cyano or nitro;

R^8 is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, halogen, cyano or nitro;

R^9 is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6 cycloalkyl or C_3-C_6 halocycloalkyl;

R^{10} is H, C_2-C_6 alkoxycarbonyl, C_2-C_6 haloalkoxycarbonyl, CO_2H or cyano;

R^{11} is C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6 cycloalkyl optionally substituted with 1-4 C_1-C_3 alkyl or C_3-C_6 halocycloalkyl;

R^{12} is cyano, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylcarbonyl, $S(O)_rR^{16}$ or $C(O)NR^{15}R^{16}$;

R^{13} is H or C_1-C_6 alkyl;

R^{14} is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkoxyalkyl, formyl, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, $C(O)NR^{15}R^{16}$, C_1-C_6 alkylsulfonyl or C_1-C_6 haloalkylsulfonyl; or R^{14} is phenyl, benzyl, benzoyl, -$CH_2C(O)$phenyl or phenylsulfonyl, each optionally substituted on the phenyl ring with C_1-C_3 alkyl, halogen, cyano or nitro;

R^{15} is H or C_1-C_6 alkyl;

R^{16} is C_1-C_6 alkyl or C_1-C_6 alkoxy; or

R^{15} and R^{16} can be taken together as $-CH_2CH_2-$, $-CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2CH_2-$ or $-CH_2CH_2OCH_2CH_2-$;

m is 0, 1 or 2;

n is 1 or 2;

p is 0, 1, or 2; and

r is 0, 1 or 2.

The dotted line in the ring containing Y in J of Formula I indicates that the ring may be unsaturated, or may be partially or fully saturated as further defined in the above recitation of Y.

In the above recitations, the term "alkyl", used either alone or in compound words such as "alkylthio" or "haloalkyl" includes straight-chain or branched alkyl, such as, methyl, ethyl, *n*-propyl, *i*-propyl, or the different butyl, pentyl or hexyl isomers. The term "1-2 alkyl" indicates that one or two of the available positions for that substituent may be alkyl. "Alkenyl" includes straight-chain or branched alkenes such as 1-propenyl, 2-propenyl, and the different butenyl, pentenyl and hexenyl isomers. "Alkenyl" also includes polyenes such as 1,2-propadienyl and 2,4-hexadienyl. "Alkynyl" includes straight-chain or branched alkynes such as 1-propynyl, 2-propynyl and the different butynyl, pentynyl and hexynyl isomers. "Alkynyl" can also include moieties comprised of multiple triple bonds such as 2,5-hexadiynyl. "Alkoxy" includes, for example, methoxy, ethoxy, *n*-propyloxy, isopropyloxy and the different butoxy, pentoxy and hexyloxy isomers. "Alkoxyalkyl" denotes alkoxy substitution on alkyl. Examples of "alkoxyalkyl" include CH_3OCH_2, $CH_3OCH_2CH_2$, $CH_3CH_2OCH_2$, $CH_3CH_2CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$. "Alkylthio" includes branched or straight-chain alkylthio moieties such as methylthio, ethylthio, and the different propylthio, butylthio, pentylthio and hexylthio isomers. "Alkylsulfinyl" includes both enantiomers of an alkylsulfinyl group. Examples of "alkylsulfinyl" include $CH_3S(O)$, $CH_3CH_2S(O)$, $CH_3CH_2CH_2S(O)$, $(CH_3)_2CHS(O)$ and the different butylsulfinyl, pentylsulfinyl and hexylsulfinyl isomers. Examples of "alkylsulfonyl" include $CH_3S(O)_2$, $CH_3CH_2S(O)_2$, $CH_3CH_2CH_2S(O)_2$, $(CH_3)_2CHS(O)_2$ and the different butylsulfonyl, pentylsulfonyl and hexylsulfonyl isomers. "Alkylamino", "dialkylamino", and the like, are defined analogously to the above examples. "Cycloalkyl" includes, for example, cyclopropyl, cyclobutyl, cyclopentyl, and cyclohexyl.

The term "halogen", either alone or in compound words such as "haloalkyl", includes fluorine, chlorine, bromine or iodine. Further, when used in compound words such as "haloalkyl", said alkyl may be partially or fully substituted with halogen atoms which may be the same or different. Examples of "haloalkyl" include F_3C, $ClCH_2$,

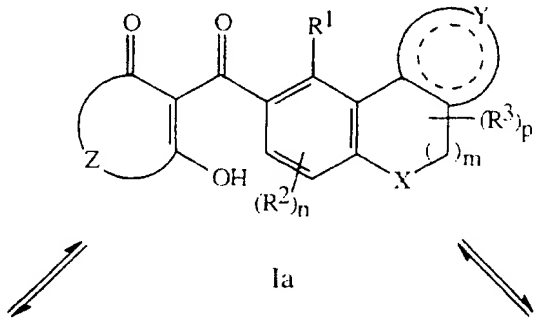
CF_3CH_2 and CF_3CCl_2. Examples of "haloalkoxy" include CF_3O, CCl_3CH_2O, $HCF_2CH_2CH_2O$ and CF_3CH_2O. Examples of "haloalkylthio" include CCl_3S, CF_3S, CCl_3CH_2S and $ClCH_2CH_2CH_2S$. Examples of "haloalkylsulfonyl" include $CF_3S(O)_2$, $CCl_3S(O)_2$, $CF_3CH_2S(O)_2$ and $CF_3CF_2S(O)_2$.

The total number of carbon atoms in a substituent group is indicated by the "C_i-C_j" prefix where i and j are numbers from 1 to 6. For example, C_1-C_3 alkylsulfonyl designates methylsulfonyl through propylsulfonyl; C_2 alkoxyalkyl designates CH_3OCH_2; C_3 alkoxyalkyl designates, for example, $CH_3CH(OCH_3)$, $CH_3OCH_2CH_2$ or $CH_3CH_2OCH_2$; and C_4 alkoxyalkyl designates the various isomers of an alkyl group substituted with an alkoxy group containing a total of four carbon atoms, examples including $CH_3CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$. Examples of "alkylcarbonyl" include $C(O)CH_3$, $C(O)CH_2CH_2CH_3$ and $C(O)CH(CH_3)_2$. Examples of "alkoxycarbonyl" include $CH_3OC(=O)$, $CH_3CH_2OC(=O)$, $CH_3CH_2CH_2OC(=O)$, $(CH_3)_2CHOC(=O)$ and the different butoxy- or pentoxycarbonyl isomers. In the above recitations, when a compound of Formula I includes a six-membered aromatic ring which contains a nitrogen atom, then all substituents on the heterocyclic ring are attached through the carbon atom(s) of that ring.

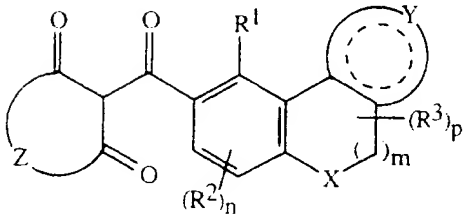
When a group contains a substituent which can be hydrogen, for example R^1 or R^{14}, then, when this substituent is taken as hydrogen, it is recognized that this is equivalent to said group being unsubstituted.

Compounds of this invention can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers, atropisomers and geometric isomers. One skilled in the art will appreciate that one stereoisomer may be more active and/or may exhibit beneficial effects when enriched relative to the other stereoisomer(s) or when separated from the other stereoisomer(s). Additionally, the skilled artisan knows how to separate, enrich, and/or to selectively prepare said stereoisomers. Accordingly, the present invention comprises compounds selected from Formula I, *N*-oxides and agriculturally suitable salts thereof. The compounds of the invention may be present as a mixture of stereoisomers, individual stereoisomers, or as an optically active form.

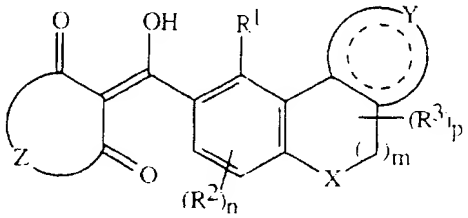
Some compounds of this invention can exist as one or more tautomers. One skilled in the art will recognize, for example, that compounds of Formula Ia (Formula I where Q is Q-1, R^4 is OR^{14}, and R^{14} is H) can also exist as the tautomers of Formulae Ib and Ic as shown below. One skilled in the art will recognize that said tautomers often exist in equilibrium with each other. As these tautomers interconvert under environmental and physiological conditions, they provide the same useful biological effects. The present invention includes mixtures of such tautomers as well as the individual tautomers of compounds of Formula I.



Ia



Ib

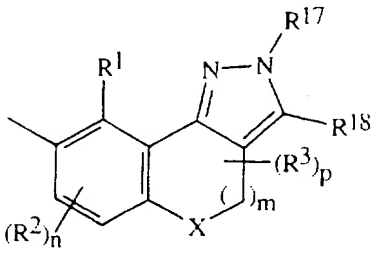


Ic

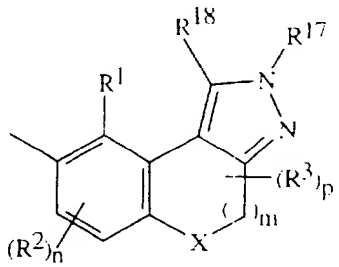
The salts of the compounds of the invention include acid-addition salts with inorganic or organic acids such as hydrobromic, hydrochloric, nitric, phosphoric, sulfuric, acetic, butyric, fumaric, lactic, maleic, malonic, oxalic, propionic, salicylic, tartaric, 4-toluenesulfonic or valeric acids. The salts of the compounds of the invention also include those formed with organic bases (e.g., pyridine, ammonia, or triethylamine) or inorganic bases (e.g., hydrides, hydroxides, or carbonates of sodium, potassium, lithium, calcium, magnesium or barium) when the compound contains an acidic group such as a carboxylic acid or enol. Preferred salts include the lithium, sodium, potassium, triethylammonium, and quaternary ammonium salts of the compounds of the invention.

Preferred compounds for reasons of better activity and/or ease of synthesis are:

Preferred 1. Compounds of Formula I, and *N*-oxides and agriculturally-suitable salts thereof, wherein J is selected from the group



J-1



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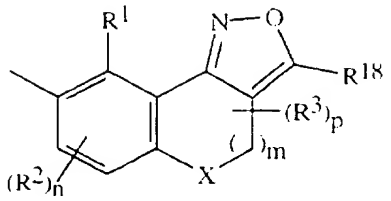

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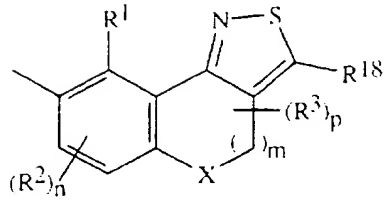

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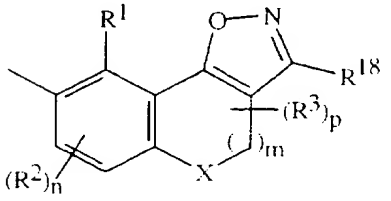

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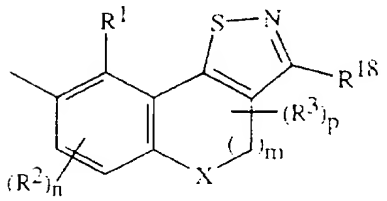

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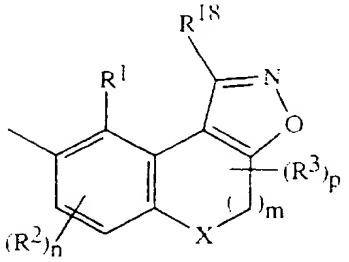
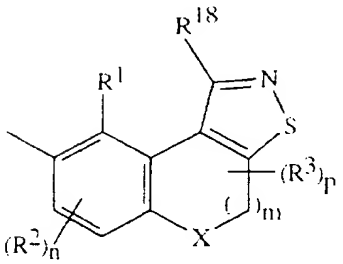
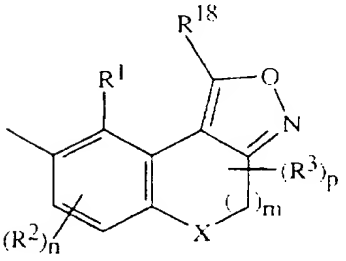


J-7



J-8



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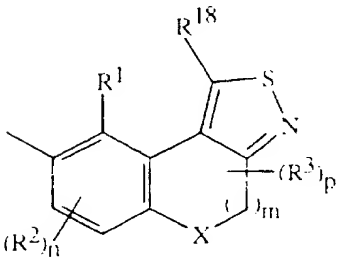

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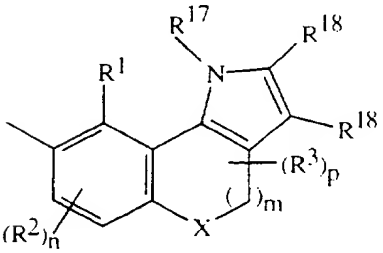

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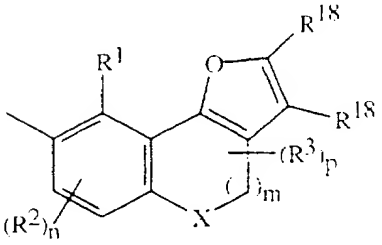

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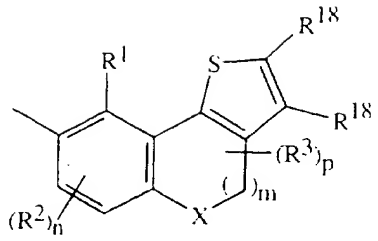

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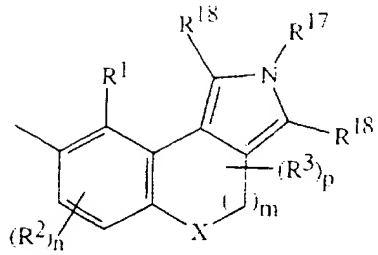

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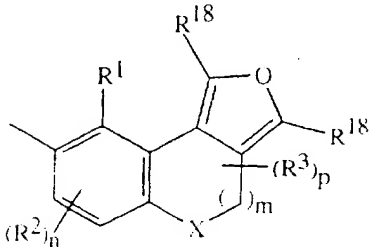

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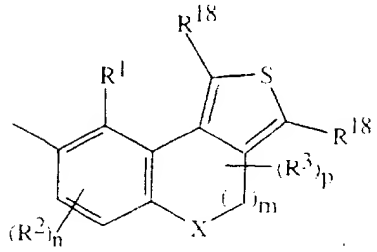

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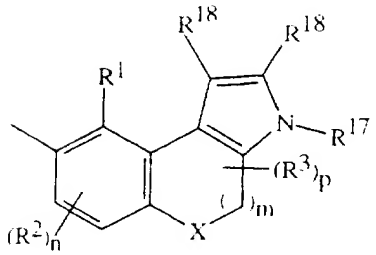

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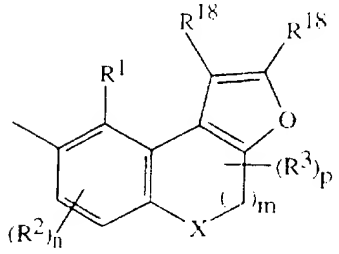

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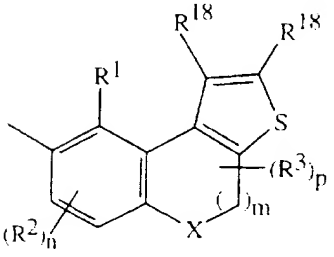

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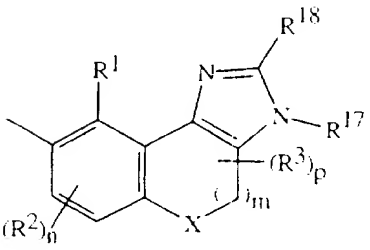

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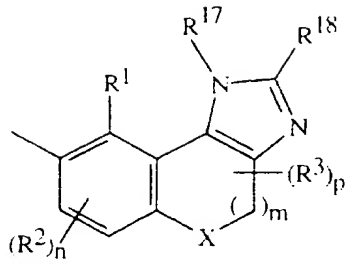

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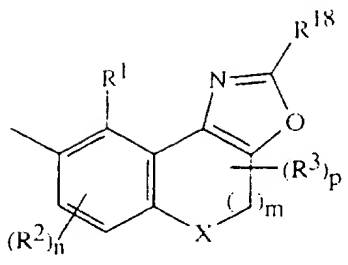

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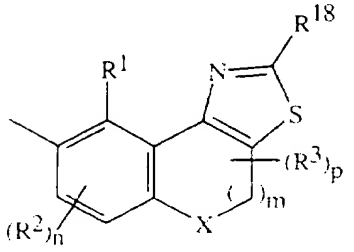

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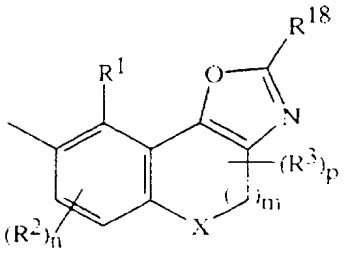

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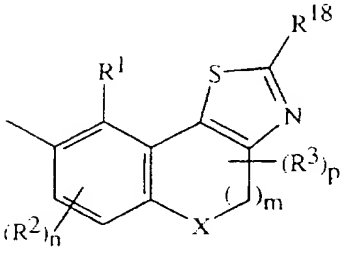

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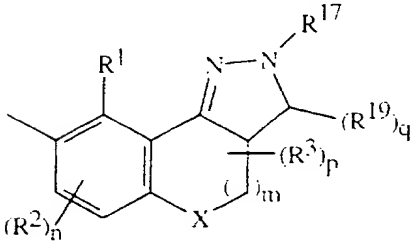

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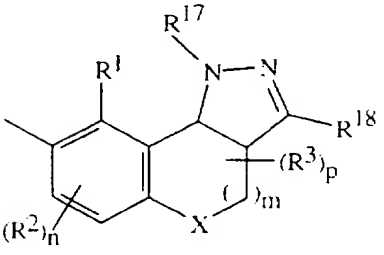

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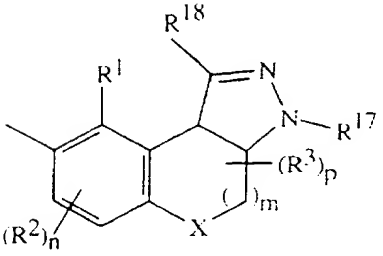

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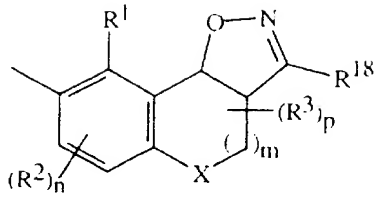

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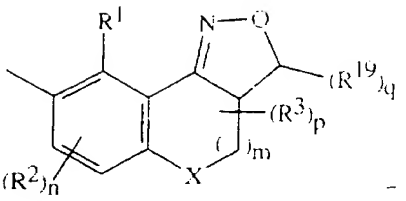

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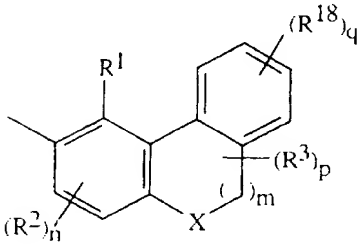

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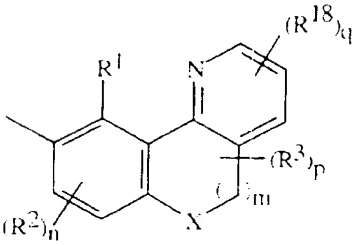

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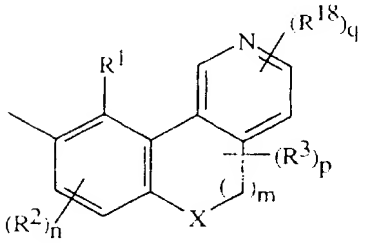

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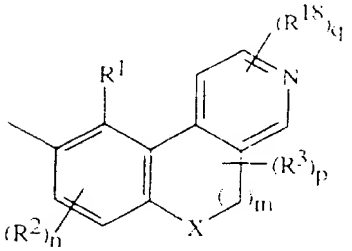

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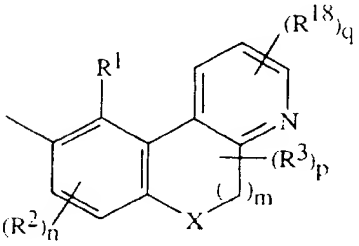

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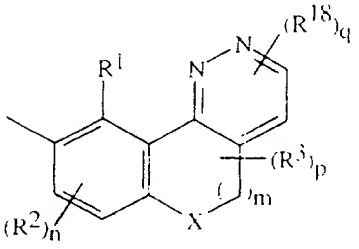

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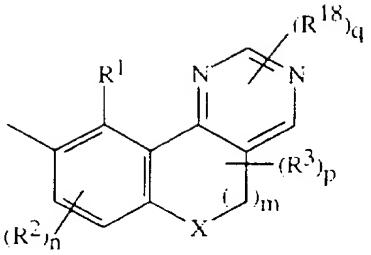

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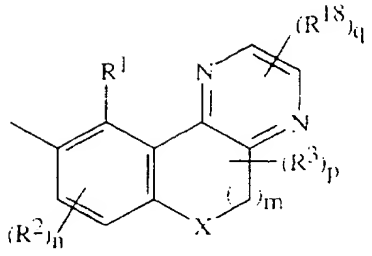

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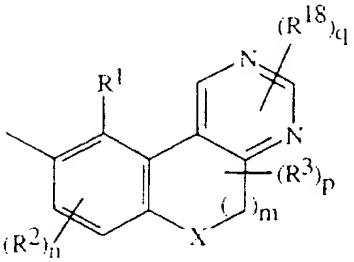

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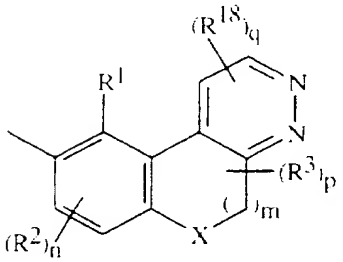

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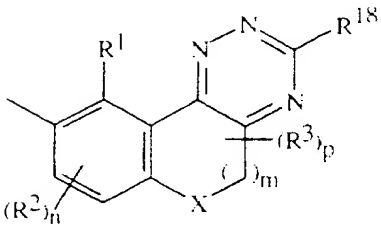

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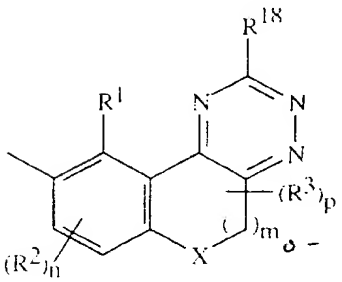
, and



J-42

R^{17} is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2–C_4 dialkylaminosulfonyl, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl or C_2-C_6 alkylcarbonyl; or R^{17} is phenyl or pyridyl, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro;

each R^{18} is independently H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2–C_4 dialkylaminosulfonyl, $NR^{15}R^{16}$, C_2-C_6

alkoxyalkyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylcarbonyl, halogen, cyano or nitro;

each R^{19} is independently H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl or C_2-C_6 alkylcarbonyl; and

q is 0, 1 or 2.

Preferred 2. Compounds of Preferred 1 wherein:

Q is Q-1.

Preferred 3. Compounds of Preferred 2 wherein:

Z is $CH_2CH_2CH_2$ optionally substituted with one to four R^5;

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^4 is OR^{14}; and

R^{14} is H or C_1-C_4 alkylsulfonyl; or R^{14} is benzoyl or phenylsulfonyl, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro.

Preferred 4. Compounds of Preferred 3 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

Preferred 5. Compounds of Preferred 1 wherein:

Q is Q-2;

Preferred 6. Compounds of Preferred 5 wherein:

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^6 is H or C_1-C_4 alkylsulfonyl; or R^6 is benzoyl or phenylsulfonyl, each optionally substituted with C_1-C_3 alkyl, halogen, cyano, or nitro;

R^7 is H, C_1-C_6 alkyl, or C_3-C_6 alkenyl; and

R^8 is H;

Preferred 7. Compounds of Preferred 6 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

Preferred 8. Compounds of Preferred 1 wherein:

Q is Q-3.

Preferred 9. Compounds of Preferred 8 wherein:

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^9 is H, C_1-C_3 alkyl, or cyclopropyl; and

R^{10} is H or C_2-C_3 alkoxycarbonyl.

Preferred 10. Compounds of Preferred 9 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

Preferred 11. Compounds of Preferred 1 wherein:

Q is Q-4.

Preferred 12. Compounds of Preferred 11 wherein:

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^{11} is C_3-C_6 cycloalkyl or C_3-C_6 halocycloalkyl, each optionally substituted with 1-4 C_1-C_3 alkyl; and

R^{12} is cyano or C_2-C_6 alkoxycarbonyl.

Preferred 13. Compounds of Preferred 12 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

Most preferred are compounds of Formula Ia above, and sodium, potassium, and quaternary ammonium salts thereof, selected from the group:

a) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide;

b) 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide;

c) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide;

d) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S*,*S*-dioxide;

e) 2-[(3-chloro-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide; and

f) 2-[(4,5-dihydro-2,7,10-trimethyl-2*H*[1]benzothiepino[5,4-*c*]pyrazol-9-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide.

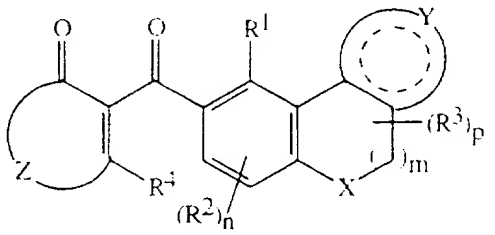
This invention also relates to herbicidal compositions comprising herbicidally effective amounts of the compounds of Formula I and at least one of a surfactant, a solid diluent or a liquid diluent. The preferred compositions of the present invention are those which comprise the above preferred compounds.

This invention also relates to a method for controlling undesired vegetation comprising applying to the locus of the vegetation herbicidally effective amounts of the compounds of Formula I (e.g., as a composition described herein). The preferred methods of use are those involving the above preferred compounds.

DETAILS OF THE INVENTION

The compounds of Formula I can be prepared by one or more of the following methods and variations as described in Schemes 1-24. The definitions of Q, X, Y, Z, R^1-R^{19}, m, n, p and r in the compounds of Formulae 1-27 below are as defined above in the Summary of the Invention. Compounds of Formulae Ia-Ig are various subsets of the compounds of Formula I, and all substituents for Formulae Ia-Ig are as defined above for Formula I.

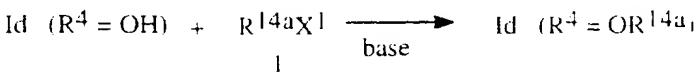
Compounds of General Formula Id can be readily prepared by one skilled in the art by using the reactions and techniques described in Schemes 1-16 of this section as well as by following the specific procedures given in Examples 1, 2 and 4.



Id

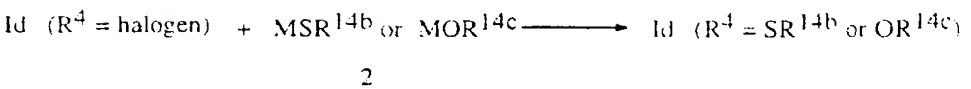
Scheme 1 illustrates the preparation of compounds of Formula Id ($R^4 = OR^{14a}$ and R^{14a} is the same as R^{14} as described in the Summary of the Invention excluding H) whereby a compound of Formula Id (R^4 = OH) is reacted with a reagent of Formula 1 in the presence of a base wherein X^1 is chlorine, bromine, fluorine, trifluorosulfonyloxy (OTf), or acetyloxy (OAc) and R^{14a} is as previously defined. The coupling is carried out by methods known in the art (or by slight modification of these methods): for example, see K. Nakamura, et al., WO 95/04054.

Scheme 1



Compounds of Formula Id (R^4 = Nu; Nu = SR^{14b} or OR^{14c}; R^{14b} is H, C_1-C_6 alkyl or C_1-C_6 haloalkyl; R^{14c} is C_1-C_6 alkyl, C_1-C_6 haloalkyl or C_2-C_6 alkoxyalkyl) can be prepared by one skilled in the art from a compound of Formula Id (R^4 = halogen) by treatment with a nucleophile of Formula 2 (Nu = SR^{14b} or OR^{14c}; M = Na, K, or Li) as shown in Scheme 2 using methods well documented in the literature (or slight modification of these methods): for example, see S. Miyano, et al., *J. Chem. Soc., Perkin Trans. 1* (1976), 1146.

Scheme 2



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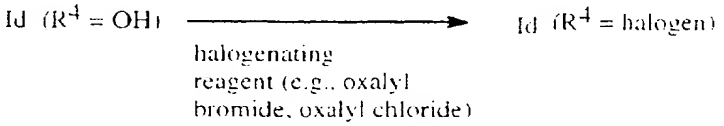
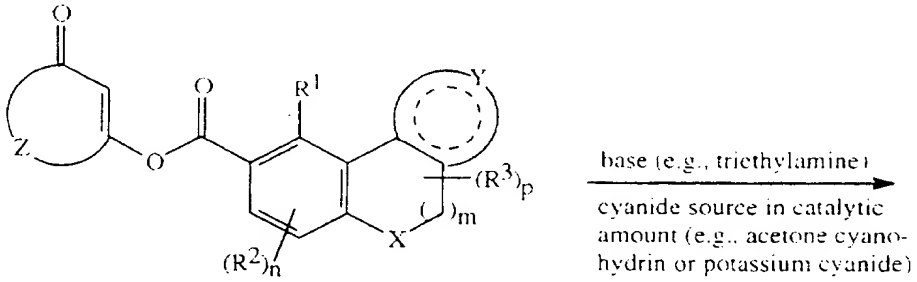
Compounds of Formula Id (R^4 = halogen) can be prepared by reacting a compound of Formula Id (R^4 = OH) with a halogenating reagent such as oxalyl bromide or oxalyl chloride (Scheme 3). This conversion is carried out by methods known in the art (or by slight modification of these methods): for example see S. Muller, et al., WO 94/13619; S. Muller, et al., DE 4,241,999.

Scheme 3



Scheme 4 illustrates the preparation of compounds of Formula Id (R^4 = OH), whereby an enol ester of Formula 3 is reacted with a base such as triethylamine in the presence of a catalytic amount of cyanide source (e.g., acetone cyanohydrin or potassium cyanide). This rearrangement is carried out by methods known in the art (or by slight modification of these methods): for example see W. J. Michaely, EP 369,803.

Scheme 4



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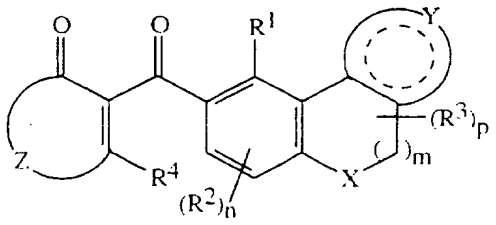
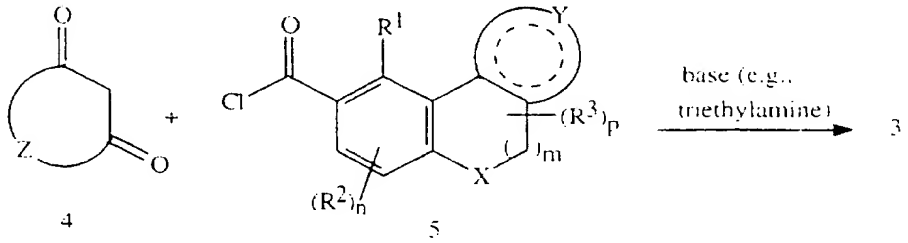


Id (R^4 = OH)

Enol esters of Formula 3 can be prepared by reacting a dione of Formula 4 with an acid chloride of Formula 5 in the presence of a slight mole excess of a base such as triethylamine in an inert organic solvent such as acetonitrile, methylene chloride or toluene at temperatures between 0 °C and 110 °C (Scheme 5). This type of coupling is known in the art: for example, see W. J. Michaely, EP 369,803.

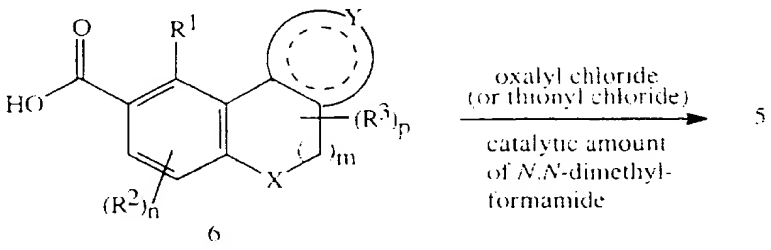
Scheme 5



4 5 3

The acid chlorides of Formula 5 can be prepared by one skilled in the art by reacting an acid of Formula 6 with chlorinating agents such as oxalyl chloride or thionyl chloride and a catalytic amount of dimethylformamide (Scheme 6). This chlorination is well known in the art: for example, see W. J. Michaely, EP 369,803.

Scheme 6

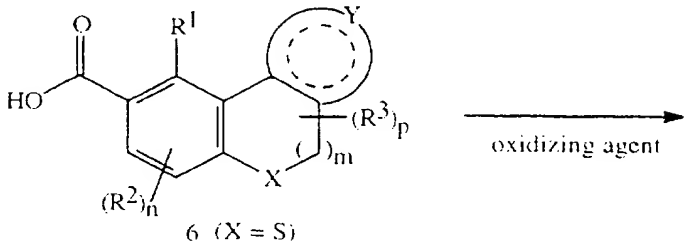


6 5

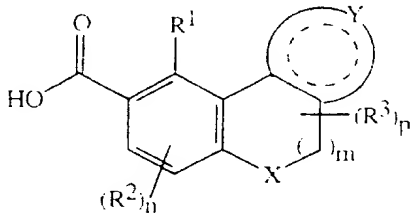
Scheme 7 illustrates the preparation of acids of Formula 6 (X = $S(O)_r$; r = 1 or 2) whereby an acid of Formula 6 (X = S) is reacted with an oxidizing reagent such as peroxyacetic acid, *m*-chloroperoxybenzoic acid, Oxone®, or hydrogen peroxide (the reaction may be buffered with a base such as sodium acetate or sodium carbonate). The oxidation is carried out by methods known in the art (or by slight modification of these methods): for example, see B. M. Trost, et al., *J. Org. Chem.* (1988), *53*, 532; B. M. Trost, et al., *Tetrahedron Lett.* (1981), *21*, 1287; S. Patai, et al., *The Chemistry of Sulphones and Sulphoxides*, John Wiley & Sons. For some acids of Formula 6 (X = S) with a functional group not compatible with the reaction conditions, the functional group may be protected before the oxidation and then be

deprotected after the oxidation. The protecting and deprotecting procedures are well known in the literature: for example see T. W. Greene, et al., *Protective Groups in Organic Synthesis* (Second Edition), John Wiley & Sons, Inc.

Scheme 7



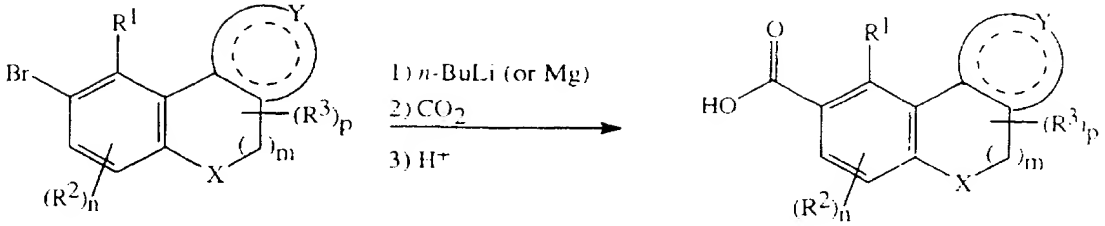
6 (X = S)



6 (X = S(O)$_r$; r = 1 or 2)

Scheme 8 illustrates the preparation of acids of Formula 6 (r = 0 if X = S(O)$_r$) whereby a phenyl bromide of Formula 7 (r = 0 if X = S(O)$_r$) is treated with *n*-butyllithium (or magnesium) and the lithium salt (or the Grignard reagent) generated *in situ* is then reacted with carbon dioxide followed by acidification with an acid such as hydrochloric acid. This conversion is carried out by methods known in the art (or by slight modification of these methods): for example, see M. A. Ogliaruso, et al., *Synthesis of Carboxylic Acids, Esters and Their Derivatives*, pp 27-28, John Wiley & Sons; A. J. Bridges, et al., *J. Org. Chem.* (1990), *55*, 773; C. Franke, et al., *Angew. Chem. Int. Ed.* (1969), *8*, 68. Protecting and deprotecting functional groups not compatible with the reaction conditions may be necessary for compounds with such a functional group.

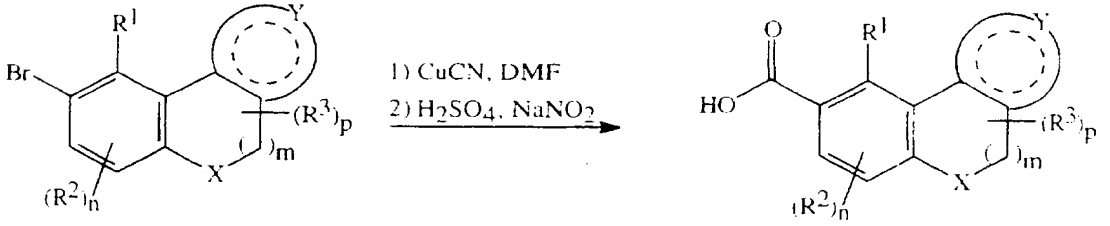
Scheme 8



7 (r = 0 if X = $S(O)_r$) 6 (r = 0 if X = $S(O)_r$)

Scheme 8a illustrates the preferred method for the preparation of acids of Formula 6 (r = 2 if X = $S(O)_r$) whereby a phenyl bromide of Formula 7 (r = 2 if X = $S(O)_r$) is treated with copper cyanide followed by hydrolysis of the intermediate nitrile to the carboxylic acid. This conversion is carried out by methods known in the art (or by slight modification of these methods): for example, see L. Friedman and H. Shechter *J. Org. Chem.* (1961), *26*, 2522. Protecting and deprotecting functional groups not compatible with the reaction conditions may be necessary for compounds with such a functional group.

Scheme 8a

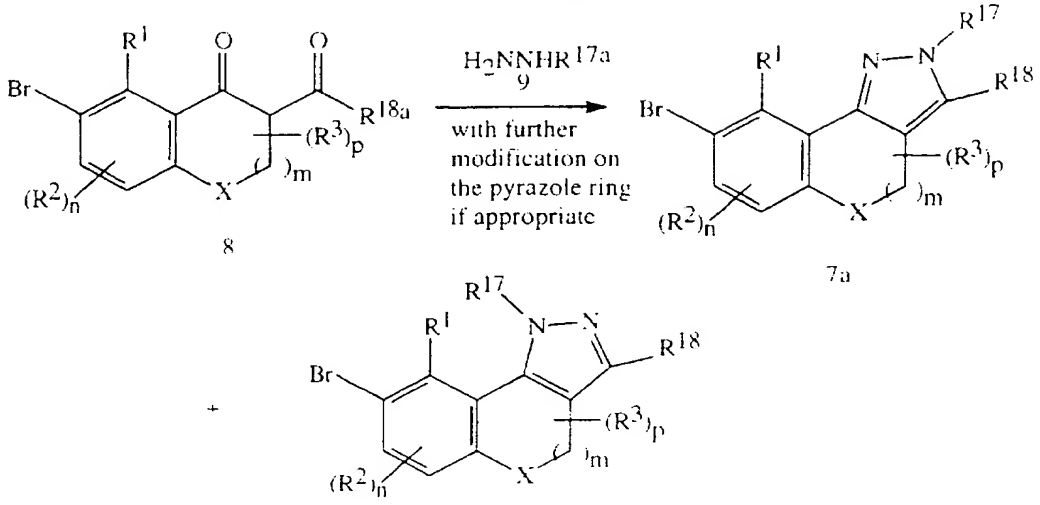


7 (r = 2 if X = $S(O)_r$) 6 (r = 2 if X = $S(O)_r$)

Phenyl bromides of Formula 7 (r = 0 if X = $S(O)_r$) can be readily prepared by one skilled in the art by using the reactions and techniques described in Schemes 9-14 (or by slight modification of these methods). Scheme 9 illustrates the preparation of phenyl bromides of Formula 7a (r = 0 if X = $S(O)_r$) and Formula 7b (r = 0 if X = $S(O)_r$) whereby a ketone of Formula 8 is reacted with a hydrazine of Formula 9. Some of the immediate products from the reactions of Scheme 9 may be further modified (e.g., conversion of OH on the pyrazole ring to Cl by treatment with $POCl_3$ or *N*-alkylation of the 1-*H*-pyrazole with an alkylating reagent such as ethyl bromide or ethyl sulfate) to give the desired phenyl bromides of Formula 7a (r = 0 if X = $S(O)_r$) and Formula 7b (r = 0 if X = $S(O)_r$). The above-mentioned reactions are carried out by methods known in the art (or by slight modification of these methods): for example, see A. R. Katritzky, et al., *Comprehensive Heterocyclic Chemistry*, *Volume 5*, p 121 and

pp 277-280, (1984) Pergamon Press; M. Hauser, et al., *J. Org. Chem.* (1961), 26, 451; E. F. M. Stephenson, *Org. Synth.* (1949), 29, 54.

Scheme 9



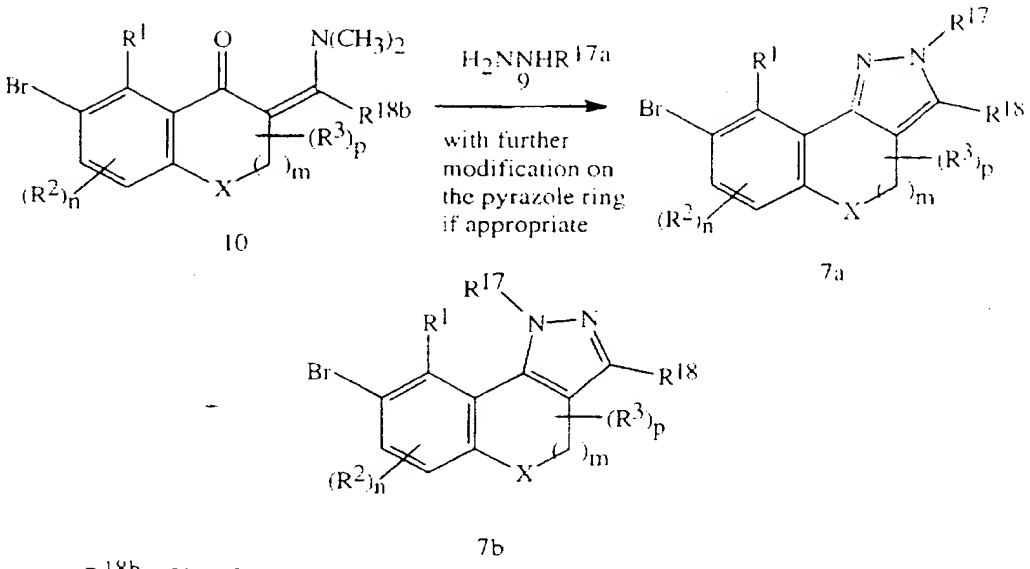
R^{17a} = H or C_1-C_4 alkyl

R^{18a} = R^{18} excluding halogen, cyano, and nitro

Alternatively, many phenyl bromides of Formula 7a (r = 0 if X = $S(O)_r$) and Formula 7b (r = 0 if X = $S(O)_r$) can also be prepared by reacting a ketone of Formula 10 with a hydrazine of Formula 9 (Scheme 10) in an inert organic solvent such as acetonitrile, ethanol or toluene at temperatures between 0 °C and 110 °C for a period of time ranging from 1 hour to 3 days. The reaction mixture is then concentrated and the resulting residue is flash column chromatographed over silica gel with eluents such as mixtures of ethyl acetate and hexanes to give the phenyl bromides of Formula 7a (r = 0 if X = $S(O)_r$) and Formula 7b (r = 0 if X = $S(O)_r$). Phenyl bromides of Formula 7a (R^{17} = H; r = 0 if X = $S(O)_r$) or Formula 7b (R^{17} = H; r = 0 if X = $S(O)_r$) may be further *N*-alkylated with an alkylating reagent such as ethyl bromide or ethyl sulfate to give the phenyl bromides of Formula 7a (R^{17} = C_1-C_6 alkyl; r = 0 if X = $S(O)_r$) and Formula 7b (R^{17} = C_1-C_6 alkyl; r = 0 if X = $S(O)_r$).

Phenyl bromides of Formula 7a (X = $S(O)_r$ and r = 0) and Formula 7b (X = $S(O)_r$ and r = 0) can also be oxidized to compounds of Formula 7a (X = $S(O)_r$ and r = 1 or 2) and Formula 7b (X = $S(O)_r$ and r = 1 or 2) by employing similar methods as described for Scheme 7.

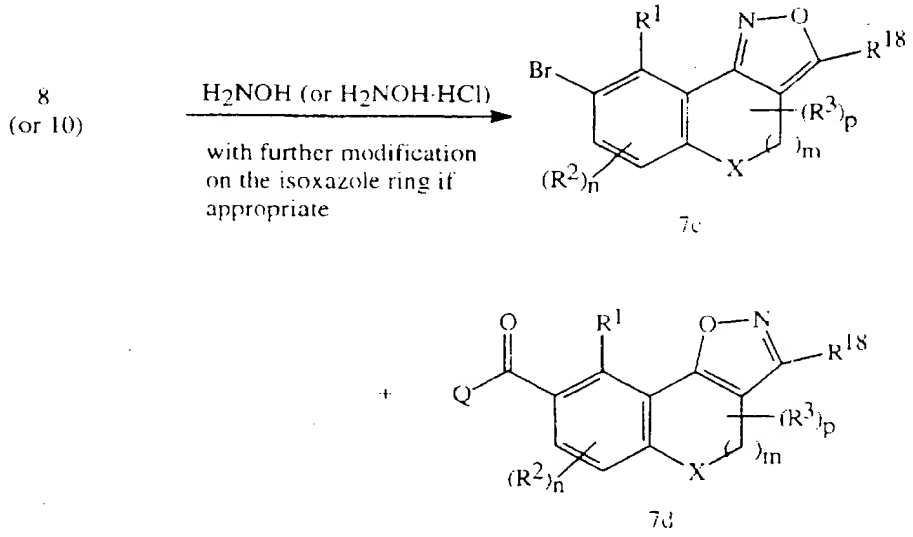
Scheme 10



R^{18b} = H or C_1-C_6 alkyl

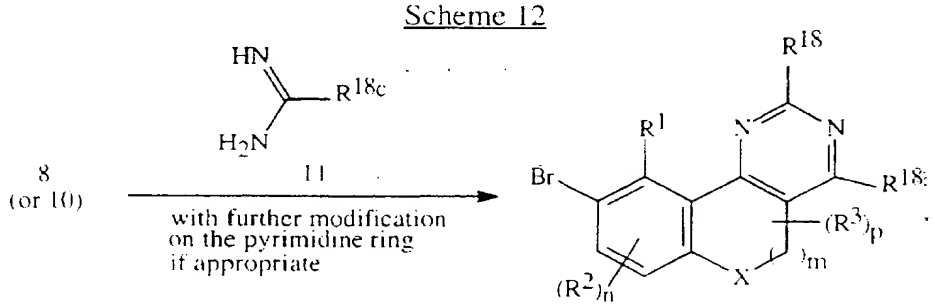
Similarly, phenyl bromides of Formula 7c (r = 0 if X = $S(O)_r$) and Formula 7d (r = 0 if X = $S(O)_r$) can also be prepared by reacting a ketone of Formula 8 or Formula 10 with hydroxylamine or hydroxylamine hydrochloride (Scheme 11). Some of the immediate products from the reactions of Scheme 11 may be further modified (e.g., conversion of OH on the isoxazole ring to Cl by treatment with $POCl_3$) to give the desired phenyl bromides of Formula 7a (r = 0 if X = $S(O)_r$) and Formula 7b (r = 0 if X = $S(O)_r$). The above-mentioned conversions are carried out by methods known in the art (or by slight modification of these methods): for example, see A. R. Katritzky, et al., *Comprehensive Heterocyclic Chemistry*, *Volume* 6, pp 61-64 and p 118, (1984) Pergamon Press; H. Boshagen, *Chem. Ber.*, (1967), *100*, 3326.

Scheme 11



Scheme 12 illustrates the preparation of phenyl bromides of Formula 7e (r = 0 if X = $S(O)_r$) whereby a ketone of Formula 8 or Formula 10 is reacted with an amidine of Formula 11. Some of the immediate products from the reactions of Scheme 12 may be further modified (e.g., conversion of OH on the pyrimidine ring to Cl by treatment with $POCl_3$ or conversion of NH_2 on the pyrimidine ring to Cl by treatment with $NaNO_2/HCl/H_2O$). The above-mentioned reactions are carried out by methods known in the art (or by slight modification of these methods): for example, see A. R. Katritzky, et al., *Comprehensive Heterocyclic Chemistry*, Volume 3, p 112-114, (1984) Pergamon Press; D. J. Brown, et al., *J. Chem. Soc. C.* (1967), 1922; I. Kogon, et al., *Org. Synth.* (1963), IV, 182.

Scheme 12

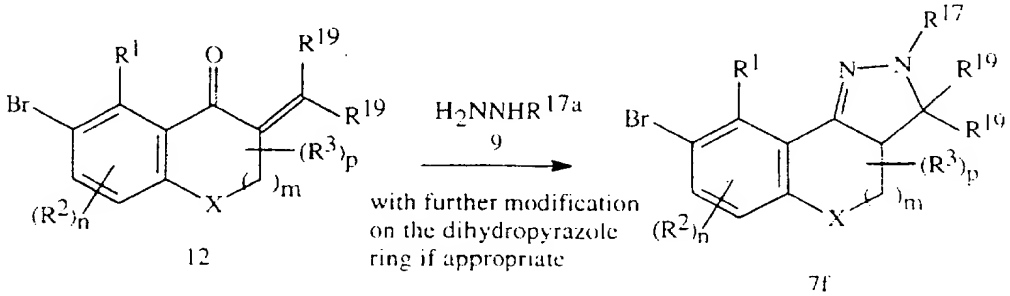


7e

R^{18c} = H, C_1-C_4 alkyl, OH or NH_2

Scheme 13 illustrates the preparation of phenyl bromides of Formula 7f (r = 0 if X = $S(O)_r$) whereby a ketone of Formula 12 is reacted with a hydrazine of Formula 9. This conversion is carried out by methods known in the art (or by slight modification of these methods): for example, see A. R. Katritzky, et al., *Comprehensive Heterocyclic Chemistry*, Volume 5, pp 278-279, (1984) Pergamon Press.

Scheme 13



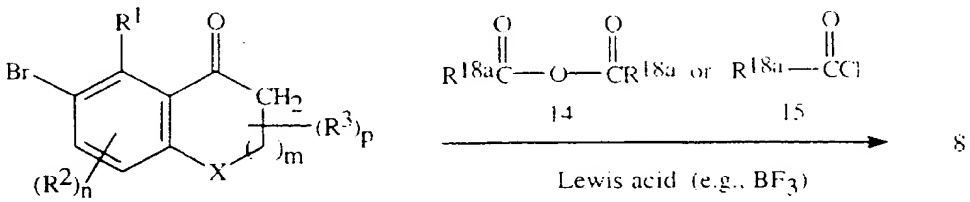
7f

Other phenyl bromides of Formula 7 can be prepared in an analogous manner using methods known in the art (or by slight modification of these methods): for

example, see A. R. Katritzky, et al., *Comprehensive Heterocyclic Chemistry*, Volumes 2-6, (1984) Pergamon Press; E. Campaigne, et al., *J. Heterocycl. Chem.*, (1969), 553; A. N. Fujiwara, *J. Heterocycl. Chem.*, (1968), 853.

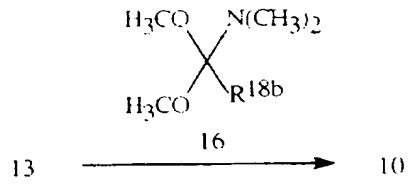
The ketones of Formula 8 can be prepared by one skilled in the art by reacting a ketone of Formula 13 with an anhydride of Formula 14 (or an acyl chloride of Formula 15) and a catalytic amount of a Lewis acid such as boron trifluoride (Scheme 14). This conversion is well known in the art: for example, see A. Philipp, et al., *Can. J. Chem.*, (1979), *57*, 3292; B. M. Perfetti, et al., *J. Am. Chem. Soc.*, (1953), *75*, 626.

Scheme 14



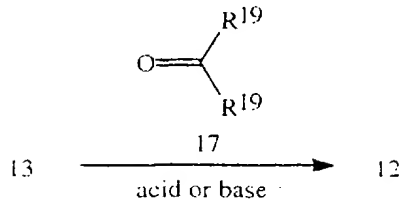
The ketones of Formula 10 can be prepared by one skilled in the art by reacting a ketone of Formula 13 with an amide dimethyl acetal of Formula 16 (Scheme 15). This conversion is well known in the art: for example, see G. Litkei, et al., *Org. Prep. Proced. Int.*, (1990), *22*, 47-56; N. Dereu, et al., *J. Organomet. Chem.*, (1981), *208*, 11; B. Gammill., *Synthesis*, (1979), 901.

Scheme 15



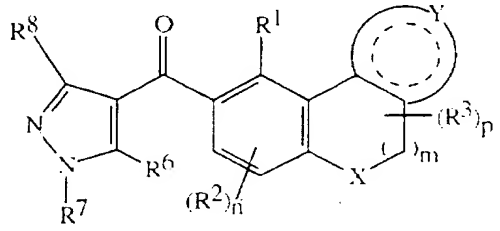
The ketones of Formula 12 can be prepared by one skilled in the art by reacting a ketone of Formula 13 with an aldehyde or a ketone of Formula 17 (or its equivalent) in the presence of an acid or a base as shown in Scheme 16. This conversion is well known in the art: for example, see J. L. Gras., *Tetrahedron Lett.*, (1978), 2111; L. Engman, et al., *Tetrahedron Lett.*, (1981), 5251; A. Roedig, et al., *Chem. Ber.*, (1960), 2294; T. Girija, et al., *J. Chem. Soc., Perk. Trans. 1*, (1991), 1467; A. J. Laurent, et al., *Tetrahedron Lett.*, (1992) 8091.

Scheme 16



The ketones of Formula 13 can be prepared by methods known in the art (or by slight modification of these methods): for example, see W. Flemming, et al., *Chem. Ber.*, (1925), *58*, 1612; I. W. J. Still, et al., *Can. J. Chem.*, (1976), *54*, 453-470; V. J. Traynelis, et al., *J. Org. Chem.*, (1961), *26*, 2728; I. Nasuno, et al., WO 94/08988.

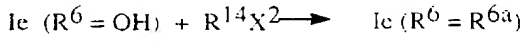
Compounds of General Formula Ie can be readily prepared by one skilled in the art by using the reactions and techniques described in Schemes 17-19 of this section as well as by following the specific procedures given in Examples 3, 5, and 6.



Ie

Scheme 17 illustrates the preparation of compounds of Formula Ie (R^{6a} is OR^{14} as described in the Summary of the Invention excluding OH) whereby a compound of Formula Ie (R^6 = OH) is reacted with a reagent of Formula 18 in the presence of a base wherein X^2 is chlorine, bromine, fluorine, OTf, or OAc and R^{6a} is as previously defined. This coupling is carried out by methods known in the art (or by slight modification of these methods): for example, see K. Nakamura, et al., WO 95/04054.

Scheme 17

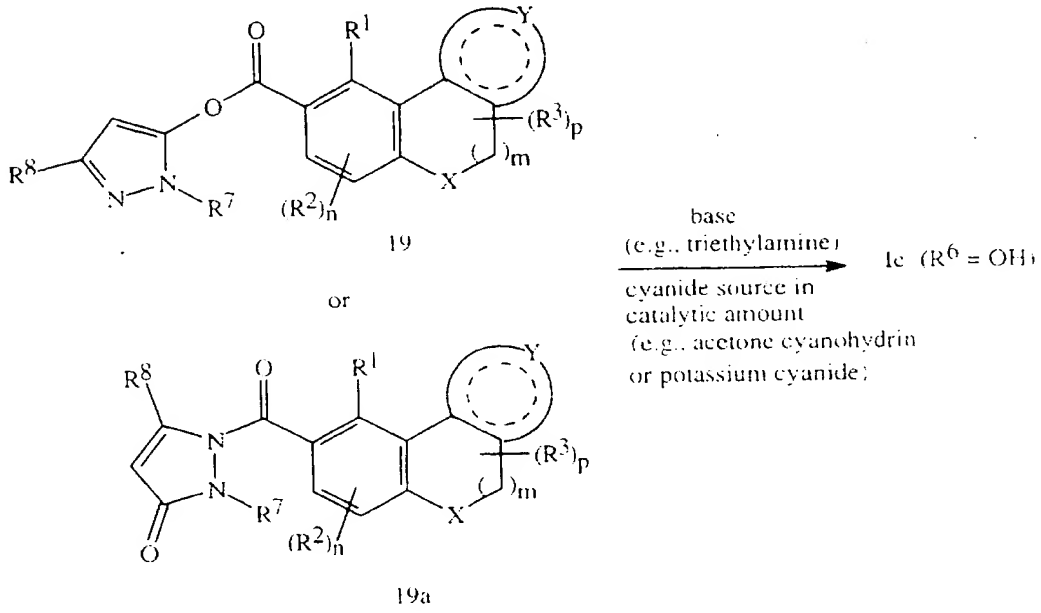


18

Scheme 18 illustrates the preparation of compounds of Formula Ie (R^6 = OH), whereby an ester of Formula 19 or its isomer 19a is reacted with a base such as triethylamine in the presence of a catalytic amount of cyanide source (e.g., acetone

cyanohydrin or potassium cyanide). This rearrangement is carried out by methods known in the art (or by slight modification of these methods): for example, see W. J. Michaely, EP 369,803.

Scheme 18

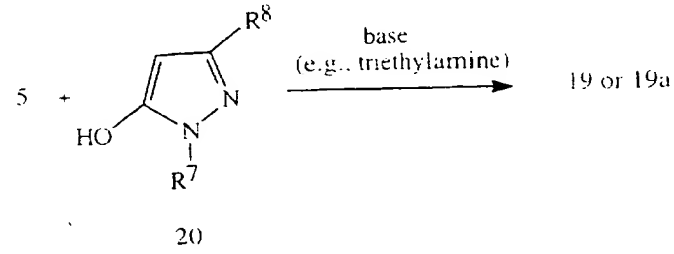


19 Ic (R^6 = OH)

19a

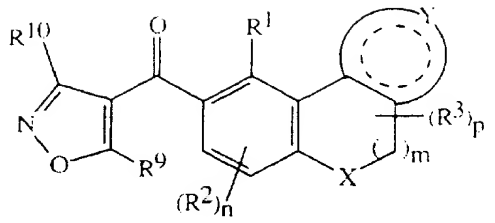
Esters of Formula 19 or amides of Formula 19a can be prepared by reacting a hydroxypyrazole of Formula 20 with an acid chloride of Formula 5 in the presence of a slight mole excess of a base such as triethylamine in an inert organic solvent such as acetonitrile, methylene chloride or toluene at temperatures between 0 °C and 110 °C (Scheme 19). This type of coupling is carried out by methods known in the art (or by slight modification of these methods): for example, see W. J. Michaely, EP 369,803.

Scheme 19



20 19 or 19a

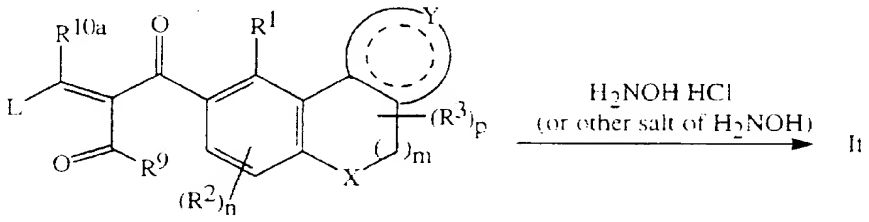
Compounds of General Formula If can be readily prepared by one skilled in the art by using the reactions and techniques described in Schemes 20-23 of this section.



If

Scheme 20 illustrates the preparation of compounds of Formula If whereby a compound of Formula 21 is reacted with a salt of hydroxylamine such as hydroxylamine hydrochloride in the presence of a base or acid acceptor such as triethylamine or sodium acetate. The substituents of the immediate products may be further modified if appropriate. This cyclization is carried out by methods known in the art (or by slight modification of these methods): for example, see P. A. Cain, et al., EP 560,483; C. J. Pearson, et al., EP 636,622.

Scheme 20



21 It

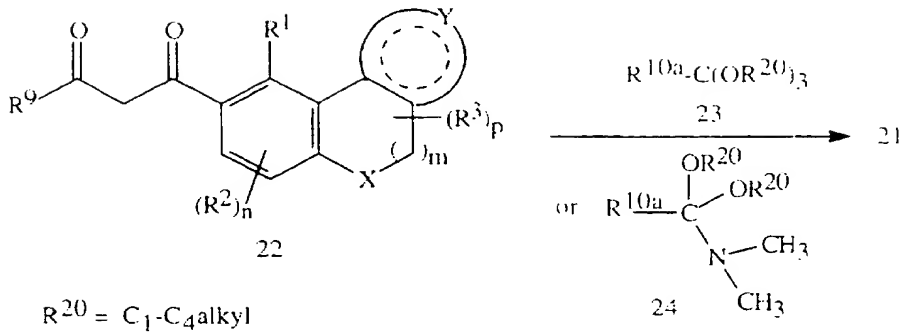
wherein

L is a leaving group such as C_1-C_4alkoxy (e.g. OC_2H_5) or *N,N*-dialkylamino (e.g. dimethyl amino)

R^{10a} is H, C_2-C_6 alkoxycarbonyl, C_2-C_6 haloalkoxycarbonyl or $CONH_2$

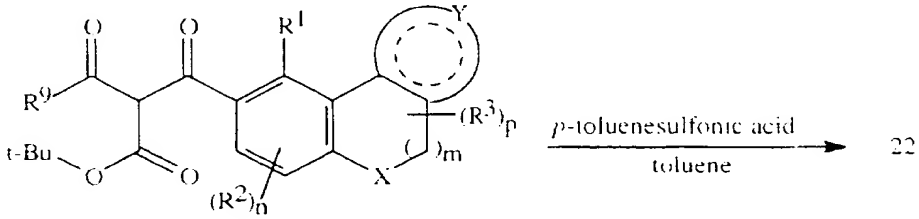
Scheme 21 illustrates the preparation of compounds of Formula 21 whereby a compound of Formula 22 is reacted with a reagent of Formula 23 or Formula 24. This conversion is carried out by methods known in the art (or by slight modification of these methods): for example, see P. A. Cain, et al., EP 560,483; C. J. Pearson, et al., EP 636,622.

Scheme 21



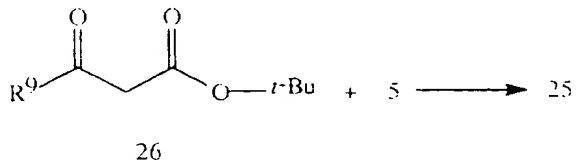
Scheme 22 illustrates the preparation of compounds of Formula 22 whereby a ester of Formula 25 is decarboxylated in the presence of a catalyst, such as *p*-toluenesulfonic acid, in an inert solvent such as toluene. This conversion is carried out by methods known in the art (or by slight modification of these methods): for example, see P. A. Cain, et al., EP 560,483; C. J. Pearson, et al., EP 636,622.

Scheme 22



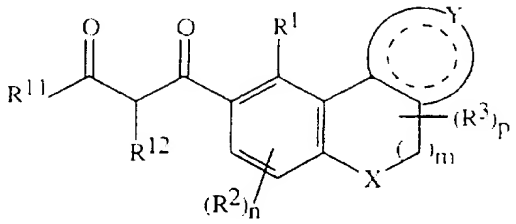
Esters of Formula 25 can be prepared by reacting the metal salt of a compound of Formula 26 with an acid chloride of Formula 5 (Scheme 23). This type of coupling is known in the art: for example see P. A. Cain, et al., EP 560,483; C. J. Pearson, et al., EP 636,622.

Scheme 23



Scheme 24 illustrates the preparation of compounds of Formula Ig whereby a compound of Formula 5 is reacted with a compound of Formula 27 in the presence of a base such as triethylamine, potassium carbonate, sodium hydride or $Mg(OEt)_2$ in an

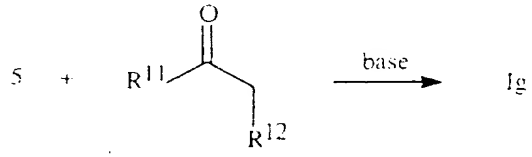
inert organic solvent such as diethyl ether, tetrahydrofuran, *N,N*-dimethylformamide, dichloromethane or acetonitrile.



Ig

This conversion is carried out by methods known in the art (or slight modification of these methods); for example, see J. W. Ashmore, EP 213,892 and P. A. Caln, EP 496,631 A1.

Scheme 24



27

It is recognized that some reagents and reaction conditions described above for preparing compounds of Formula I may not be compatible with certain functionalities present in the intermediates. In these instances, the incorporation of protection/deprotection sequences or functional group interconversions into the synthesis will aid in obtaining the desired products. The use and choice of the protecting groups will be apparent to one skilled in chemical synthesis (see, for example, Greene, T. W.; Wuts, P. G. M. *Protective Groups in Organic Synthesis*, 2nd ed.; Wiley: New York, 1991). One skilled in the art will recognize that, in some cases, after the introduction of a given reagent as it is depicted in any individual scheme, it may be necessary to perform additional routine synthetic steps not described in detail to complete the synthesis of compounds of Formula I.

One skilled in the art will also recognize that compounds of Formula I and the intermediates described herein can be subjected to various electrophilic, nucleophilic, radical, organometallic, oxidation, and reduction reactions to add substituents or modify existing substituents.

Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The

following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Percentages are by weight except for chromatographic solvent mixtures or where otherwise indicated. Parts and percentages for chromatographic solvent mixtures are by volume unless otherwise indicated. ^{1}H NMR spectra are reported in ppm downfield from tetramethylsilane; s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet.

Example 1

Step A: Preparation of 3-[(2,5-dimethylphenyl)thio]propanoic acid

43.4 g (1.086 mol) of sodium hydroxide was added to 230 mL of water, 75.0 g (0.543 mol) of 2,5-dimethylthiophenol (purchased from Aldrich Chemical Company) was then added and the mixture was cooled to about 10 °C. 91.30 g (0.597 mol) of 3-bromopropionic acid (purchased from Aldrich Chemical Company) was added in portions keeping the temperature below 25 °C. The mixture was warmed to room temperature, stirred for 2 hr under nitrogen, and was then washed with diethyl ether (3 x 500 mL). The aqueous layer was acidified with 1N HCl and filtered to yield 112.79 g of the title compound of Step A as a solid melting at 97-98 °C. ^{1}H NMR ($CDCl_3$): δ 2.3 (s,3H), 2.34 (s,3H), 2.68 (t,2H), 3.1 (t,2H), 6.9 (d,1H), 7.06-7.14 (m,2H).

Step B: Preparation of 2,3-dihydro-5,8-dimethyl-4*H*-1-benzothiopyran-4-one

530 mL of concentrated sulfuric acid was added to 24.91 g (0.119 mol) of the title compound of Step A while being cooled with an acetone/ice bath. The ice bath was removed, the mixture stirred for 1 hr and was then poured over crushed ice. The aqueous layer was extracted with a 1 : 9 mixture of diethyl ether : hexane (6 x 500 mL), dried ($MgSO_4$), filtered, and evaporated to dryness to yield 11.75 g of the title compound of Step B as an oil. ^{1}H NMR ($CDCl_3$): δ 2.3 (s,3H), 2.6 (s,3H), 2.97 (m,2H), 3.2 (m,2H), 6.9-7.1 (m,2H).

Step C: Preparation of 6-bromo-2,3-dihydro-5,8-dimethyl-4*H*-1-benzothiopyran-4-one

A solution of 4.07 g (0.021 mol) of the title compound of Step B in 25 mL of methylene chloride was added dropwise to a mixture of 7.07 g (0.053 mol) of aluminum chloride (purchased from Aldrich Chemical Company) and 25 mL of methylene chloride. The suspension was stirred for approximately 15 minutes, 1.14 mL (0.022 mol) of bromine (purchased from Janssen) was added dropwise and the mixture was refluxed for 10 minutes. The hot mixture was poured into 10 mL of concentrated hydrochloric acid containing 75 g of ice, stirred for 10 minutes, diluted with 50 mL of water, and extracted with diethyl ether (2 x 200 mL). The organic layer was washed with water (2 x 200 mL), dried (Na_2SO_4), filtered and evaporated to dryness. The crude product was chromatographed over silica gel eluting with ethyl acetate : hexane (5% :

95%) to yield 2.62 g of the title compound of Step C as a solid melting at 87-88 °C. ^{1}H NMR ($CDCl_3$): δ 2.3 (s,3H), 2.6 (s,3H), 3.0 (m,2H), 3.2 (m,2H), 7.45 (s,1H).

Step D: Preparation of 6-bromo-3-[(dimethylamino)methylene]-2,3-dihydro-5,8-dimethyl-4*H*-1-benzothiopyran-4-one

20.0 g (0.074 mole) of the title compound of Step C and 100 mL of *N,N*-dimethylformamide dimethyl acetal (purchased from Aldrich Chemical Company) were stirred under nitrogen at reflux overnight. The mixture was concentrated, the residue was stirred in water, and filtered. The solid was dissolved in methylene chloride, dried ($MgSO_4$), filtered, and evaporated to dryness to yield 21.54 g of the title compound of Step D as an oil. ^{1}H NMR ($CDCl_3$): δ 2.49 (s,3H), 2.56 (s,3H), 3.16 (s,6H), 3.86 (s,2H), 7.34 (s,1H), 7.57 (s,1H).

Step E: Preparation of 8-bromo-2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazole

4.53 mL (0.085 mol) of methyl hydrazine (purchased from Aldrich Chemical Company) was added dropwise to a mixture of 21.54 g (0.066 mol) of the title compound of Step D in 115 mL of ethanol. The mixture was stirred at reflux under nitrogen for 5 hr and was then evaporated to dryness. The crude product was chromatographed over silica gel eluting with a mixture of (1 : 9) ethyl acetate : hexane to yield two components. Concentration of the major fraction yielded 14.72 g of the title compound of Step E as an oil; ^{1}H NMR ($CDCl_3$): δ 2.3 (s,3H), 2.82 (s,3H), 3.76 (s,2H), 3.9 (s,3H), 7.2 (s, 1H), 7.3 (s,1H). Concentration of the minor fraction yielded 3.87 g of the isomer 8-bromo-1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazole as an oil; ^{1}H NMR ($CDCl_3$): δ 2.3 (s,3H), 2.46 (s,3H), 3.75 (s,3H), 3.59 and 3.81 (2d,2H), 7.4 (s,1H), 7.45 (s,1H).

Step F: Preparation of 2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazole-8-carboxylic acid

3.73 mL (0.050 mol) of bromoethane (purchased from Aldrich Chemical Company) was added dropwise to a mixture of 2.11 g (0.088 mol) of magnesium in 70 mL of tetrahydrofuran. After stirring for 10 minutes, a solution of 7.77 g (0.025 mol) of the title compound of Step E in 100 mL of tetrahydrofuran was added dropwise and the mixture stirred at reflux under nitrogen overnight. After cooling to room temperature, carbon dioxide was bubbled into the mixture for 1 hr keeping the temperature below 20 °C. 55 mL of 10% hydrochloric acid was added dropwise and the resulting mixture was allowed to stir for 5 hr at room temperature. The mixture was evaporated to dryness, extracted with ethyl acetate (3 x 250 mL), dried (Na_2SO_4), filtered, and evaporated to dryness. The residue was triturated in hexane, the hexane was decanted, and the residue was dissolved in 1M sodium carbonate. The aqueous solution was extracted with diethyl ether (3 x 200 mL), acidified with concentrated hydrochloric acid, and extracted with diethyl ether (3 x 300 mL). The combined organic

layers were dried ($MgSO_4$), filtered, and evaporated to dryness to yield 2.55 g of the title compound of Step F as a solid melting at 195 °C (decomposed). ^1H NMR (Me_2SO-d_6): δ 2.3 (s, 3H), 2.77 (s,3H), 3.89 (m,5H), 7.4 (s,1H), 7.6 (s,1H).

Step G: Preparation of 2,4-dihydro-2,6,9-trimethyl[1]benzothiopyran[4,3-c]pyrazole-8-carboxylic acid 5,5-dioxide

6.70 mL (0.066 mol) of hydrogen peroxide (35%) was added to 50 mL of trifluoroacetic acid, and allowed to stir under nitrogen for 30 minutes. The solution was cooled to about 0 °C, and 4.46 g (0.016 mol) of the title compound of Step F was added in portions while keeping the temperature below 15 °C. The mixture stirred at room temperature overnight and then 2 mL of methyl sulfide was added to the mixture. The resulting mixture was allowed to stir for 15 minutes and was then evaporated to dryness. The residue was triturated in a mixture of diethyl ether : hexane (8 : 2), allowed to stand overnight, and the organic mixture was decanted. The residue was triturated in water, and an orange solid was removed. The orange solid was dissolved in 250 mL of chloroform, dried ($MgSO_4$), filtered, and evaporated to dryness to yield a portion of the title compound of Step G. The diethyl ether : hexane (8 : 2) decant was concentrated, the residue was triturated in water, and the water was decanted. The residue was dissolved in chloroform, dried ($MgSO_4$), filtered, and evaporated to dryness to yield the title compound of Step G. The two products were combined to yield 3.62 g of the title compound of Step G as a semi-solid. ^1H NMR (Me_2SO-d_6): δ 2.63 (s,3H), 2.7 (s,3H), 3.9 (s,3H), 4.7 (s,2H), 7.5 (s,1H), 7.8 (s,1H).

Step H: Preparation of 3-oxo-1-cylcohexen-1-yl 2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carboxylate 5,5-dioxide

3.62 g (0.0118 mol) of the title compound of Step G, 3.09 mL (0.035 mol) of oxalyl chloride (purchase from Janssen), and 2 drops of *N,N*-dimethylformamide were added to 50 mL of methylene chloride. The mixture was refluxed under nitrogen for 2 hr, and was then evaporated to dryness. 50 mL of methylene chloride was added to the residue and was then evaporated to dryness. Another 50 mL of methylene chloride was added to the residue, and the solution was cooled to about 0 °C. 1.46 g (0.013 mol) of 1,3-cyclohexanedione (purchased from Aldrich Chemical Company) was added followed by 5.1 mL (0.0366 mol) of triethylamine, and the mixture was stirred overnight while warming to room temperature. The mixture was evaporated to dryness, and the crude product was chromatographed over silica gel eluting with a mixture of methylene chloride : diethyl ether (9 : 1) to yield 1.53 g of the title compound of Step H as a solid melting at 158-160 °C. ^1H NMR ($CDCl_3$): δ 2.2 (m,2H), 2.5 (m,2H), 2.7 (m,2H), 2.78 (s,3H), 2.9 (s,3H), 3.99 (s,3H), 4.39 (s,2H), 6.1 (s,1H), 7.5 (s,1H), 7.6 (s,1H).

Step I: Preparation of 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide

1.44 g (0.0036 mol) of the title compound of Step H, 2 drops of acetone cyanohydrin (purchased from Aldrich Chemical Company), and 0.88 mL (0.0063 mol) of triethylamine were added to 100 mL of acetonitrile and the mixture was allowed to stir overnight at room temperature under nitrogen. About 0.10 g of potassium cyanide was added to the mixture, and the mixture was stirred for 1 hr. The mixture was evaporated to dryness and water was added to the residue. The mixture was acidified to pH 1 with concentrated hydrochloric acid and then filtered to provide the crude product. The crude product was dissolved in methylene chloride and the solution was dried ($MgSO_4$), filtered, and evaporated to dryness to yield 0.79 g of the title compound of Step I, a compound of the invention, as a solid melting at 228 °C (dec.). ^1H NMR ($CDCl_3$): δ 1.96 (m,2H), 2.4 (m,2H), 2.48 (s,3H), 2.6 (s,3H), 2.7 (m,2H), 3.8 (s,3H), 4.27 (s,2H), 6.8 (s,1H), 7.3 (s,1H).

Example 2

Step A: Preparation of 1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carboxylic acid

6.74 g (0.021 mol) of 8-bromo-1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazole (from Example 1, Step E) was added to 150 mL of tetrahydrofuran and cooled to -70 °C. 10.4 mL (0.026 mol) of 2.5 M *n*-butyllithium in hexanes (purchased from Aldrich Chemical Company) was added dropwise keeping the temperature below -60 °C. After stirring for 10 minutes, carbon dioxide was bubbled into the mixture for 1 hr. The mixture warmed to room temperature, 200 mL of hexane was added, and then the mixture was filtered. The solid was added to 300 mL of water, acidified to about pH 1 with concentrated hydrochloric acid and then filtered. The filtered residue was dissolved in chloroform and the solution was dried ($MgSO_4$), filtered and evaporated to dryness to yield 4.02 g of the title compound of Step A as a solid melting at >230 °C. ^1H NMR ($CDCl_3$): δ 2.4 (s,3H), 2.7 (s,3H), 3.77 (s,3H), 3.67 and 3.88 (2d,2H), 7.48 (s,1H), 7.88 (s,1H).

Step B: Preparation of 1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carboxylic acid 5,5-dioxide

5.8 mL (0.0598 mol) of 35% hydrogen peroxide was added to 50 mL of trifluoroacetic acid and the mixture was allowed to stir under nitrogen for 30 minutes. The solution was cooled to about 0 °C, 4.0 g (0.0145 mol) of the title compound of Step A was added in portions while keeping the temperature below 15 °C, the mixture was then stirred at room temperature for 2 days. 2 mL of methyl sulfide was added to the mixture. The mixture was allowed to stir for 15 minutes and was then evaporated to dryness. The residue was stirred in a diethyl ether : hexane (8 : 2) mixture for 30 minutes and filtered to yield approximately 6.0 g of the title compound of Step B as a

solid melting at >210°C. ^{1}H NMR (Me_2SO-d_6): δ 2.5(s,3H), 2.63 (s, 3H), 3.7 (s, 3H), 4.7 (m, 2H), 7.68 (s,1H), 7.8 (s,1H).

Step C: Preparation of 3-oxo-1-cyclohexen-1-yl 1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carboxylate 5,5-dioxide

2.0 g (0.0065 mol) of the title compound of Step B, 1.71 mL (0.0196 mol) of oxalyl chloride (purchase from Janssen), and 2 drops of *N,N*-dimethylformamide were added to 50 mL of methylene chloride. The mixture was refluxed under nitrogen for 2 h and was then evaporated to dryness. 50 mL of methylene chloride was added to the residue and it was then evaporated to dryness. Another 50 mL of methylene chloride was added to the residue and the solution was cooled to about 0 °C. 0.80 g (0.0071 mol) of 1,3-cyclohexanedione (purchased from Aldrich Chemical Company) was added followed by 2.8 mL (0.020 mol) of triethylamine, and the mixture was stirred for 3 days while warming to room temperature. The mixture was evaporated to dryness and the crude product was chromatographed over silica gel eluting with a mixture of ethyl acetate : hexane (6 : 4) to yield 0.86 g of the title compound of Step C as a solid melting at 196 °C (decomposed). ^{1}H NMR ($CDCl_3$): δ 2.2(m,2H), 2.5 (m,2H), 2.64 (s,3H), 2.7 (m,2H), 2.8 (s,3H), 3.8 (s,3H), 4.3 and 4.4 (2d, 2H), 6.06 (s,1H), 7.65 (s,1H), 7.94 (s,1H).

Step D: Preparation of 2-[(1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide

0.80 g (0.0020 mol) of the title compound of Step C, 2 drops of acetone cyanohydrin (purchased from Aldrich Chemical Company), and 0.49 mL (0.0035 mol) of triethylamine were added to 100 mL of acetonitrile and the mixture was allowed to stir overnight at room temperature under nitrogen. The mixture was evaporated to dryness and water was added to the residue. The resulting mixture was acidified to pH 1 with concentrated hydrochloric acid and filtered to provide the crude product. The crude product was dissolved in methylene chloride and the solution was dried ($MgSO_4$), filtered and evaporated to dryness to yield 0.47 g of the title compound of Step D, a compound of the invention, as a solid melting at >220 °C. ^{1}H NMR ($CDCl_3$): δ 2.1 (m,2H), 2.3 (s,3H), 2.6-2.76 (m,7H), 3.8 (s,3H), 4.2-4.4 (m,2H), 6.98-7.6 (2H).

Example 3

Step A: Preparation of 1-ethyl-1*H*-pyrazol-5-yl 1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carboxylate 5,5-dioxide

2.0 g (0.0065 mol) of the title compound of Step B in Example 2, 1.71 mL (0.0196 mol) of oxalyl chloride (purchase from Janssen), and 2 drops of *N,N*-dimethylformamide were added to 50 mL of methylene chloride. The mixture was refluxed under nitrogen for 2 h and was then evaporated to dryness. 50 mL of methylene chloride was added to the residue and it was evaporated to dryness. Another 50 mL of methylene chloride was added to the residue and the solution was cooled to

about 0 °C. 0.80 g (0.0071 mol) of 1-ethyl-1*H*-pyrazol-5-ol was added followed by 2.8 mL (0.020 mol) of triethylamine, and the mixture was stirred for 3 days while warming to room temperature. The mixture was evaporated to dryness and the crude product was chromatographed over silica gel eluting with a mixture of ethyl acetate : hexane (6 : 4) to yield 0.40 g of the title compound of Step A as a solid melting at 173-175°C. ^{1}H NMR ($CDCl_3$): δ 1.5 (t,3H), 2.7 (s,3H), 2.8 (s,3H), 3.8 (s,3H), 4.1 (q,2H), 4.3 and 4.4 (2d,2H), 6.2-8.0 (4H).

Step B: Preparation of (1,4-dihydro-1,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl) (1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S,S*-dioxide

0.38 g (0.95 mmol) of the title compound of Step A, 1 drop of acetone cyanohydrin (purchased from Aldrich Chemical Company), and 0.23 mL (1.66 mmol) of triethylamine were added to 50 mL of acetonitrile and the mixture was allowed to stir at room temperature under nitrogen overnight. The mixture was evaporated to dryness and water was added to the residue. The resulting mixture was acidified to pH 1 with concentrated hydrochloric acid and filtered to yield 0.12 g of the title compound of Step B, a compound of the invention, as a solid melting at 96 °C (decomposed). ^{1}H NMR ($CDCl_3$): δ 1.5 (t,3H), 2.60 (s,3H), 2.76 (s,3H), 3.83 (s,3H), 4.0-4.4 (m,4H), 7.4-7.8 (m,3H).

Example 4

Step A: Preparation of 3-[(4-bromo-2,5-dimethylphenyl)thio]propanoic acid

25.23 g (0.12 mol) of the title compound of Example 1, Step A was dissolved in 250 mL of dichloromethane and cooled to 5 °C. A solution of 19.12 g (0.12 mol) of bromine in 25 mL of dichloromethane was added dropwise over 45 minutes, keeping the reaction temperature at 5 °C. The reaction was then allowed to warm to room temperature, diluted with 200 mL of dichloromethane and washed twice with 400 mL of water. The organice layer was separated, dried over magnesium sulfate, filtered, and concentrated under reduced pressure to yield 34.35 g of the title compound of step A as a white solid melting at 105-107 °C. ^{1}H NMR ($CDCl_3$): δ 2.33 (s,3H), 2.34 (s, 3H), 2.67 (t, 2H), 3.10 (t, 2H), 7.18 (s, 1H), 7.36 (s, 1H).

Step B: Preparation of 6-bromo-2,3-dihydro-5,8-dimethyl-4*H*-1-benzothiopyran-4-one

19.50 g (67.4 mmol) of the title compound of Step A was dissolved in 156 mL of dichloromethan and cooled to 5 °C. 78 mL of concentrated sulfuric acid was added dropwise over 45 minutes with vigorous stirring and the reaction was then allowed to stir at 5 °C for 1.5 hours. The reaction was poured into 500 mL of ice water, the layers were separated and the aqueous phase extracted twice with 300 mL of dichloromethane. The combined organic layers were washed twice with 1.0 N NaOH, once with water, dried over magnesium sulfate and concentrated under reduced pressure to yield 16.04 g

of the title compound of Step B as a yellow solid melting at 86-87 °C. ^{1}H NMR ($CDCl_3$): δ 2.26 (s, 3H), 2.59 (s, 3H), 3.00 (t, 2H), 3.19 (t, 2H), 7.45 (s, 1H).

Step C: Preparation of 8-bromo-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-c]pyrazole

2.80 g (10 mmol) of the title compound of Step B and 1.79 g(15 mmol) of *N,N*-dimethylformamide dimethyl acetal were dissolved in 16 mL of ethyl acetate and heated to reflux. The methanol/ethyl acetate mixture was removed via a Dean Stark trap and was replaced with fresh ethyl acetate. After heating to reflux for 4 hours, the reaction was cooled to room temperature and allowed to stand overnight. It was then reluxed further for 2 hours, cooled to 60 °C, and 0.75 g (15 mmol) of hydrazine monohydrate was added. The reaction was reheated to reflux for 1 hour, cooled to room temperature, and diluted to 100 mL with ethyl acetate. The organic phase was washed twice with 100 mL of water, dried over magnesium sulfate, and concentrated under reduced pressure to yield 3.10 g of an oily yellow solid. This solide was triturated with hexanes, collected by filtration, washed further with hexanes, and dried to yield 2.79 g of the title compound of Step C as a pale yellow solid melting at 162-164 °C. ^{1}H NMR ($CDCl_3$): δ 2.34 (s, 3H), 2.79 (s, 3H), 3.84 (s, 2H), 7.35 (s, 1H), 7.46 (s, 1H), 10.4 (br s).

Step D: Preparation of 8-bromo-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-c]pyrazole

A mixture of 6.09 g (20 mmol) of the title compound of Step C, 1.52 g (23 mmol) of potassium hydroxide, 0.31 g (5% by weight of the title compound of Step C) of tetrabutylammonium hydrogen sulfate, 25 mL of toluene, and 25 mL of water was stirred fo 15 minutes at room temperature. 3.85 g (25 mmol) of diethyl sulfate was added and the reaction stirred vigorously for 6.5 hours. The reaction was then diluted with 250 mL of ethyl acetate, washed twice with 100 mL of 1.0 N HCl, once with brine, dried over magnesium sulfate and concentrated under reduced pressure. The crude oil was dissolved in 300 mL of methanol, 3 mL of a 25% sodium methoxide/methanol solution was added and the resulting solution was concentrated at 60 °C under reduced pressure. The mixture was then redissolved in diethyl ether and 1.0 N HCl, the layers were separated, and the organic phase was washed with brine, dried over magnesium sulfate, and concentrated under reduced pressure to yield 6.50 g of a reddish oil. GC analysis showed a ratio of approximately 10:1 of the title compound of Step D to the 1-ethyl isomer. ^{1}H NMR ($CDCl_3$): δ 1.52 (t, 3H), 2.32 (s, 3H), 2.83 (s, 3H), 3.77 (s, 2H), 4.18 (q, 2H), 7.23 (s, 1H), 7.30 (s, 1H).

Step E: Preparation of 8-bromo-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-c]pyrazole 5,5-dioxide

6.42 g (approximately 17 mmol) of the crude title compound of Step D, 32 mL of glacial acetic acid, and 12 drops of concentrated sulfuric acid were heated to 70 °C. The heat source was removed and 7.76 g (80 mmol) of 35% aqueous hydrogen peroxide

was added dropwise over 15 minutes, keeping the reaction temperature at about 70 °C. After 1 hour at 73-74 °C, the reaction was cooled to room temperature, poured into 400 mL of ethyl acetate, washed with 400 mL of water, 400 mL of aqueous sodium meta-bisulfite, aqueous sodium bicarbonate, and brine. A check for peroxides with starch-iodide paper was negative. The organic phase was dried over magnesium sulfate and concentrated under reduced pressure to yield 6.90 g of a yellow solid. This solid was dissolved in 100 mL of dichloromethane and rinsed through a one inch bed of silica gel which was further rinsed with one liter of dichloromethane. The combined rinses were concentrated under reduced pressure to yield 5.70 g of the title compound of Step E as an off-white solid melting at 138-141 °C. ^{1}H NMR ($CDCl_3$): δ 1.54 (t, 3H), 2.70 (s, 3H), 2.85 (s, 3H), 4.22 (q, 2H), 4.35 (s, 2H), 7.44 (s, 1H), 7.50 (s, 1H).

Step F: Preparation of 2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carbonitrile 5,5-dioxide

3.00 g (8 mmol) of the title compound of Step E, 1.07 g (12 mmol) of copper (I) cyanide, and 50 mL of *N,N*-dimethylformamide were heated to reflux for 5.5 hours and then let stir at room temperature overnight. The reaction was then diluted with 300 mL of ethyl acetate, washed twice with 200 mL of a solution of 50% saturated ammonium chloride in water with 20 mL of 35% ammonium hydroxide added, washed twice with 300 mL of water, dried over magnesium sulfate and concentrated under reduced pressure to yield 2.50 g of a tan solid. This solid was dissolved in 50 mL of dichloromethane and rinsed through a one inch bed of silica gel, which was further rinsed with 500 mL of dichloromethane and then 200 mL of 10% ethyl acetate:dichloromethane. The rinses were separately concentrated under reduced pressure. The dichloromethane rinse yielded 2.31 g of the title compound of Step F as an off-white solid melting at 185-187 °C. ^{1}H NMR ($CDCl_3$): δ 1.53 (t, 3H), 2.35 (s, 3H), 2.92 (s, 3H), 3.86 (s, 2H), 4.20 (q, 2H), 7.26 (s, 1H), 7.27 (s, 1H).

Step G: Preparation of 2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-c]pyrazole-8-carboxylic acid 5,5-dioxide

1.00 g (3.2 mmol) of the title compound of Step F, 2 mL of water, and 6 mL of sulfuric acid were heated to 140 °C for one hour. The reaction was allowed to cool to 60 °C and 0.25 g of sodium nitrite in 1 mL of water was added dropwise over 30 minutes and stirring was continued for another 30 minutes. The reaction was allowed to cool to room temperature, poured into 25 mL of ice water and the resulting solid was isolated by filtration and washed with 5 mL of cold water. Drying overnight yielded 1.02 g of a tan solid. The aqueous filtrate was extracted three times with 50 mL of dichloromethane and the organic phases were combined, dried over magnesium sulfate and concentrated under reduced pressure to yield 0.36 g of a brown oil. This oil and the isolated solid were dissolved in 50 mL of 1.0 N sodium hydroxide, washed with 25 mL of diethyl ether, acidified with concentrated HCl, and extracted four times with 50 mL

of ethyl acetate. The combined organic layers were dried over magnesium sulfate and concentrated under reduced pressure to yield 0.98 g of the title compound of Step G as a tan solid melting at 204-206 °C. ^{1}H NMR ($CDCl_3$): δ 1.53 (t, 3H), 2.38 (s, 3H), 2.99 (s, 3H), 3.83 (s, 2H), 4.21 (q, 2H), 7.26 (s, 1H), 7.68 (s, 1H).

Step H: Preparation of 3-oxo-1-cyclohexen-1-yl 2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazole-8-carboxylate 5,5-dioxide

6.0 g (0.019 mol) of the title compound of Step G, 4.9 mL (0.056 mol) of oxalyl chloride (purchase from Janssen), and 2 drops of *N,N*-dimethylformamide were added to 50 mL of methylene chloride. The mixture was refluxed under nitrogen for 2 hr and was evaporated to dryness. 50 mL of methylene chloride was added to the residue and it was evaporated to dryness. Another 50 mL of methylene chloride was added to the residue and the solution was cooled to about 0 °C. 2.31 g (0.021 mol) of 1,3-cyclohexanedione (purchased from Aldrich Chemical Company) was added followed by 8.1 mL (0.058 mol) of triethylamine and the mixture was stirred overnight while warming to room temperature. The mixture was evaporated to dryness and the crude product was chromatographed over silica gel eluting with a mixture of ethyl acetate : hexane (6 : 4) to yield 1.78 g of the title compound of Step H as a solid melting at 160-162 °C. ^{1}H NMR ($CDCl_3$): δ 1.6 (t,3H), 2.2 (m,2H), 2.5 (m,2H), 2.7 (m,2H), 2.8 (s,3H), 2.9 (s,3H), 4.2 (q,2H), 4.4 (m,2H), 6.07 (s,1H), 7.46-7.6 (m,2H).

Step I: Preparation of 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide

1.70 g (0.0041 mol) of the title compound of Step H, 2 drops of acetone cyanohydrin (purchased from Aldrich Chemical Company), and 1.0 mL (0.0072 mol) of triethylamine were added to 100 mL of acetonitrile and the mixture was allowed to stir at room temperature under nitrogen overnight. About 0.05 g of potassium cyanide was then added to the mixture and it was stirred for 4 h. The mixture was evaporated to dryness and water was added to the residue. The resulting mixture was acidified to pH 1 with concentrated hydrochloric acid and filtered to yield 1.51 g of the title compound of Step I, a compound of the invention, as a solid melting at 205 °C (decomposed). ^{1}H NMR ($CDCl_3$): δ 1.5 (t,3H), 2.06 (m,2H), 2.5 (m,2H), 2.6 (m,2H), 2.7 (s,3H), 2.8 (m,2H), 4.2 (q,2H), 4.4 (m,2H), 6.9-7.4 (m,2H).

Example 5

Step A: Preparation of 1-ethyl-1*H*-pyrazol-5-yl 2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazole-8-carboxylate 5,5-dioxide

5.9 g (0.018 mol) of the title compound of Step G in Example 4, 4.8 mL (0.055 mol) of oxalyl chloride (purchase from Janssen), and 2 drops of *N,N*-dimethylformamide were added to 50 mL of methylene chloride. The mixture was refluxed under nitrogen for 2 h and was then evaporated to dryness. 50 mL of methylene chloride was added to the residue and it was evaporated to dryness.

Another 50 mL of methylene chloride was added to the residue and the solution was cooled to about 0°C. 2.48 g (0.022 mol) of 1-ethyl-1*H*-pyrazol-5-ol was added followed by 7.97 mL (0.057 mol) of triethylamine, and the mixture was stirred overnight while warming to room temperature. The mixture was evaporated to dryness and the crude product was chromatographed over silica gel eluting with a mixture of ethyl acetate : hexane (6 : 4) to yield 0.18 g of the title compound of Step A as a solid melting at 137°C (decomposed). ^{1}H NMR ($CDCl_3$): δ 1.45 (t,3H), 1.56 (t,3H), 2.8 (s,3H), 2.9 (s,3H), 4.1 (m,2H), 4.3 (m,2H), 4.4 (m,2H), 6.3-7.7 (m,4H).

Step B: Preparation of (2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S,S*-dioxide

0.18 g (0.43 mmol) of the title compound of Step A, 0.50 drops of acetone cyanohydrin (purchased from Aldrich Chemical Company), and 0.11 mL (0.76 mmol) of triethylamine were added to 25 mL of acetonitrile and the mixture was allowed to stir at room temperature under nitrogen overnight. About 0.05 g of potassium cyanide was added to the mixture and it was stirred for 4 h. About 0.03 g of potassium cyanide was then added and the mixture was allowed to stir for 1h. The mixture was evaporated to dryness and water was added to the residue. The resulting mixture was then acidified to pH 1 with concentrated hydrochloric acid, and filtered to yield 0.11 g of the title compound of Step B, a compound of the invention, as a solid melting at 97 °C (decomposed). ^{1}H NMR ($CDCl_3$): δ 1.47 (t, 3H), 1.54 (t, 3H), 2.7 (s, 3H), 2.8 (s, 3H), 4.1 (q, 2H), 4.2 (q, 2H), 4.4 (m, 2H), 7.2-7.45 (m,3H).

Example 6

Step A: Preparation of 1-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-2-ethyl-1,2-dihydro-3*H*-pyrazol-3-one *S,S*-dioxide

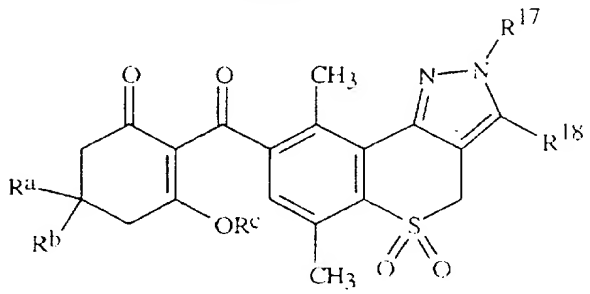
4.0 g (0.013 mol) of the title compound of Step G in Example 1, 3.42 mL (0.039 mol) of oxalyl chloride (purchased from Janssen) and 2 drops of *N,N*-dimethylformamide were added to 50 mL of methylene chloride. The mixture was refluxed for 2 h and was then evaporated to dryness. 50 mL of methylene chloride was added to the residue and it was evaporated to dryness. Another 50 mL of methylene chloride was added to the residue and the solution was cooled to about 0 °C. 1.60 g (0.014 mol) of 1-ethyl-1*H*-pyrazol-5-ol was added followed by 5.62 mL (0.040 mol) of triethylamine, and the mixture was stirred under nitrogen overnight while warming to room temperature. The mixture was evaporated to dryness and the crude product was chromatographed over silica gel eluting first with a mixture of ethyl acetate : hexane (7 : 3) and then with ethyl acetate to yield 1.35 g of the title compound of Step A as a solid melting at >210 °C. ^{1}H NMR ($CDCl_3$): δ 7.45 (s, 1H), 7.2-7.35 (m, 2H), 5.74 (d, 1H), 4.4 (m, 4H), 3.98 (s, 3H), 2.78 (s, 3H), 2.7 (s, 3H), 1.3 (t, 3H).

Step B: Preparation of (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S,S*-dioxide

1.3 g (3.25 mmol) of the title compound of Step A, 1 drop of acetone cyanohydrin (purchased from Aldrich Chemical Company), and 0.79 mL (5.69 mmol) of triethylamine were added to 25 mL of acetonitrile and the mixture was allowed to stir at room temperature under nitrogen for 15 min. 0.06 g of potassium cyanide was then added and the mixture was allowed to stir at room temperature under nitrogen overnight. Another 0.03 g of potassium cyanide was added and the reaction mixture was allowed to stir at room temperature under nitrogen for another 3 days. The mixture was evaporated to dryness and water was added to the residue. The resulting mixture was acidified to pH 1 with concentrated hydrochloric acid and filtered. The solid collected was dissolved in methylene chloride and the resulting solution was dried over $MgSO_4$ and then concentrated to yield 0.48 g of the title compound of Step B, a compound of the invention, as a solid melting at 133 °C (decomposed). ^1H NMR (Me_2SO-d_6): δ 7.86 (s, 1H), 7.32 (s, 1H), 7.25 (s, 1H), 4.72 (s, 2H), 3.9-4.0 (m, 5H), 2.64 (s, 3H), 2.57 (s, 3H), 1.28 (t, 3H).

By the procedures described herein together with methods known in the art, the following compounds of Tables 1 to 18 can be prepared. The following abbreviation is used in the Tables which follow: Ph = phenyl.

Table 1



R^a	R^b	R^c	R^{17}	R^{18}
H	H	PhC(=O)	H	H
H	CH_3	PhC(=O)	H	H
CH_3	CH_3	PhC(=O)	H	H
H	H	PhC(=O)CH_2	H	H
H	CH_3	PhC(=O)CH_2	H	H
CH_3	CH_3	PhC(=O)CH_2	H	H
H	H	4-CH_3PhC(=O)	H	H
H	CH_3	4-CH_3PhC(=O)	H	H
CH_3	CH_3	4-CH_3PhC(=O)	H	H
H	H	$CH_3S(O)_2$	H	H
H	CH_3	$CH_3S(O)_2$	H	H
CH_3	CH_3	$CH_3S(O)_2$	H	H
H	H	$CH_3CH_2S(O)_2$	H	H
H	CH_3	$CH_3CH_2S(O)_2$	H	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	H	H
H	H	$CH_3CH_2CH_2S(O)_2$	H	H
H	CH_3	$CH_3CH_2CH_2S(O)_2$	H	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	H	H
H	H	$PhS(O)_2$	H	H
H	CH_3	$PhS(O)_2$	H	H
CH_3	CH_3	$PhS(O)_2$	H	H
H	H	4-CH_3PhS(O)$_2$	H	H
H	CH_3	4-CH_3PhS(O)$_2$	H	H
CH_3	CH_3	4-CH_3PhS(O)$_2$	H	H

H	H	PhC(=O)	CH_3	H
H	CH_3	PhC(=O)	CH_3	H
CH_3	CH_3	PhC(=O)	CH_3	H
H	H	$PhC(=O)CH_2$	CH_3	H
H	CH_3	$PhC(=O)CH_2$	CH_3	H
CH_3	CH_3	$PhC(=O)CH_2$	CH_3	H
H	H	4-CH_3PhC(=O)	CH_3	H
H	CH_3	4-CH_3PhC(=O)	CH_3	H
CH_3	CH_3	4-CH_3PhC(=O)	CH_3	H
H	H	$CH_3S(O)_2$	CH_3	H
H	CH_3	$CH_3S(O)_2$	CH_3	H
CH_3	CH_3	$CH_3S(O)_2$	CH_3	H
H	H	$CH_3CH_2S(O)_2$	CH_3	H
H	CH_3	$CH_3CH_2S(O)_2$	CH_3	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3	H
H	H	$CH_3CH_2CH_2S(O)_2$	CH_3	H
H	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	H
H	H	$PhS(O)_2$	CH_3	H
H	CH_3	$PhS(O)_2$	CH_3	H
CH_3	CH_3	$PhS(O)_2$	CH_3	H
H	H	4-CH_3PhS(O)$_2$	CH_3	H
H	CH_3	4-CH_3PhS(O)$_2$	CH_3	H
CH_3	CH_3	4-CH_3PhS(O)$_2$	CH_3	H
H	H	PhC(=O)	CH_3CH_2	H
H	CH_3	PhC(=O)	CH_3CH_2	H
CH_3	CH_3	PhC(=O)	CH_3CH_2	H
H	H	$PhC(=O)CH_2$	CH_3CH_2	H
H	CH_3	$PhC(=O)CH_2$	CH_3CH_2	H
CH_3	CH_3	$PhC(=O)CH_2$	CH_3CH_2	H
H	H	4-CH_3PhC(=O)	CH_3CH_2	H
H	CH_3	4-CH_3PhC(=O)	CH_3CH_2	H
CH_3	CH_3	4-CH_3PhC(=O)	CH_3CH_2	H
H	H	$CH_3S(O)_2$	CH_3CH_2	H
H	CH_3	$CH_3S(O)_2$	CH_3CH_2	H
CH_3	CH_3	$CH_3S(O)_2$	CH_3CH_2	H
H	H	$CH_3CH_2S(O)_2$	CH_3CH_2	H
H	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	H

CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	H
H	H	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	H
H	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	H
H	H	$PhS(O)_2$	CH_3CH_2	H
H	CH_3	$PhS(O)_2$	CH_3CH_2	H
CH_3	CH_3	$PhS(O)_2$	CH_3CH_2	H
H	H	4-$CH_3PhS(O)_2$	CH_3CH_2	H
H	CH_3	4-$CH_3PhS(O)_2$	CH_3CH_2	H
CH_3	CH_3	4-$CH_3PhS(O)_2$	CH_3CH_2	H
H	H	PhC(=O)	$CH_3CH_2CH_2$	H
H	CH_3	PhC(=O)	$CH_3CH_2CH_2$	H
CH_3	CH_3	PhC(=O)	$CH_3CH_2CH_2$	H
H	H	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	H
H	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	H
H	H	4-$CH_3PhC(=O)$	$CH_3CH_2CH_2$	H
H	CH_3	4-$CH_3PhC(=O)$	$CH_3CH_2CH_2$	H
CH_3	CH_3	4-$CH_3PhC(=O)$	$CH_3CH_2CH_2$	H
H	H	$CH_3S(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	H
H	H	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	H
H	H	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	H
H	H	$PhS(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	H
H	H	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	H
H	H	PhC(=O)	H	CH_3
H	CH_3	PhC(=O)	H	CH_3
CH_3	CH_3	PhC(=O)	H	CH_3
H	H	$PhC(=O)CH_2$	H	CH_3

H	CH_3	$PhC(=O)CH_2$	H	CH_3
CH_3	CH_3	$PhC(=O)CH_2$	H	CH_3
H	H	4-$CH_3PhC(=O)$	H	CH_3
H	CH_3	4-$CH_3PhC(=O)$	H	CH_3
CH_3	CH_3	4-$CH_3PhC(=O)$	H	CH_3
H	H	$CH_3S(O)_2$	H	CH_3
H	CH_3	$CH_3S(O)_2$	H	CH_3
CH_3	CH_3	$CH_3S(O)_2$	H	CH_3
H	H	$CH_3CH_2S(O)_2$	H	CH_3
H	CH_3	$CH_3CH_2S(O)_2$	H	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	H	CH_3
H	H	$CH_3CH_2CH_2S(O)_2$	H	CH_3
H	CH_3	$CH_3CH_2CH_2S(O)_2$	H	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	H	CH_3
H	H	$PhS(O)_2$	H	CH_3
H	CH_3	$PhS(O)_2$	H	CH_3
CH_3	CH_3	$PhS(O)_2$	H	CH_3
H	H	4-$CH_3PhS(O)_2$	H	CH_3
H	CH_3	4-$CH_3PhS(O)_2$	H	CH_3
CH_3	CH_3	4-$CH_3PhS(O)_2$	H	CH_3
H	H	$PhC(=O)$	CH_3	CH_3
H	CH_3	$PhC(=O)$	CH_3	CH_3
CH_3	CH_3	$PhC(=O)$	CH_3	CH_3
H	H	$PhC(=O)CH_2$	CH_3	CH_3
H	CH_3	$PhC(=O)CH_2$	CH_3	CH_3
CH_3	CH_3	$PhC(=O)CH_2$	CH_3	CH_3
H	H	4-$CH_3PhC(=O)$	CH_3	CH_3
H	CH_3	4-$CH_3PhC(=O)$	CH_3	CH_3
CH_3	CH_3	4-$CH_3PhC(=O)$	CH_3	CH_3
H	H	$CH_3S(O)_2$	CH_3	CH_3
H	CH_3	$CH_3S(O)_2$	CH_3	CH_3
CH_3	CH_3	$CH_3S(O)_2$	CH_3	CH_3
H	H	$CH_3CH_2S(O)_2$	CH_3	CH_3
H	CH_3	$CH_3CH_2S(O)_2$	CH_3	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3	CH_3
H	H	$CH_3CH_2CH_2S(O)_2$	CH_3	CH_3
H	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	CH_3

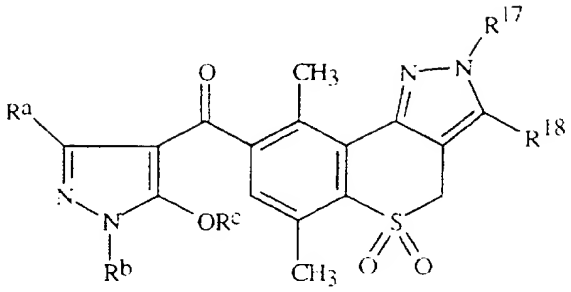
H	H	$PhS(O)_2$	CH_3	CH_3
H	CH_3	$PhS(O)_2$	CH_3	CH_3
CH_3	CH_3	$PhS(O)_2$	CH_3	CH_3
H	H	$4\text{-}CH_3PhS(O)_2$	CH_3	CH_3
H	CH_3	$4\text{-}CH_3PhS(O)_2$	CH_3	CH_3
CH_3	CH_3	$4\text{-}CH_3PhS(O)_2$	CH_3	CH_3
H	H	PhC(=O)	CH_3CH_2	CH_3
H	CH_3	PhC(=O)	CH_3CH_2	CH_3
CH_3	CH_3	PhC(=O)	CH_3CH_2	CH_3
H	H	$PhC(=O)CH_2$	CH_3CH_2	CH_3
H	CH_3	$PhC(=O)CH_2$	CH_3CH_2	CH_3
CH_3	CH_3	$PhC(=O)CH_2$	CH_3CH_2	CH_3
H	H	$4\text{-}CH_3PhC(=O)$	CH_3CH_2	CH_3
H	CH_3	$4\text{-}CH_3PhC(=O)$	CH_3CH_2	CH_3
CH_3	CH_3	$4\text{-}CH_3PhC(=O)$	CH_3CH_2	CH_3
H	H	$CH_3S(O)_2$	CH_3CH_2	CH_3
H	CH_3	$CH_3S(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$CH_3S(O)_2$	CH_3CH_2	CH_3
H	H	$CH_3CH_2S(O)_2$	CH_3CH_2	CH_3
H	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	CH_3
H	H	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	CH_3
H	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	CH_3
H	H	$PhS(O)_2$	CH_3CH_2	CH_3
H	CH_3	$PhS(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$PhS(O)_2$	CH_3CH_2	CH_3
H	H	$4\text{-}CH_3PhS(O)_2$	CH_3CH_2	CH_3
H	CH_3	$4\text{-}CH_3PhS(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$4\text{-}CH_3PhS(O)_2$	CH_3CH_2	CH_3
H	H	PhC(=O)	$CH_3CH_2CH_2$	CH_3
H	CH_3	PhC(=O)	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	PhC(=O)	$CH_3CH_2CH_2$	CH_3
H	H	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	CH_3
H	H	$4\text{-}CH_3PhC(=O)$	$CH_3CH_2CH_2$	CH_3
H	CH_3	$4\text{-}CH_3PhC(=O)$	$CH_3CH_2CH_2$	CH_3

CH_3	CH_3	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	CH_3
H	H	$CH_3S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	H	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	H	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	H	$PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
H	H	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	CH_3
H	H	PhC(=O)	H	Cl
H	CH_3	PhC(=O)	H	Cl
CH_3	CH_3	PhC(=O)	H	Cl
H	H	$PhC(=O)CH_2$	H	Cl
H	CH_3	$PhC(=O)CH_2$	H	Cl
CH_3	CH_3	$PhC(=O)CH_2$	H	Cl
H	H	4-CH_3PhC(=O)	H	Cl
H	CH_3	4-CH_3PhC(=O)	H	Cl
CH_3	CH_3	4-CH_3PhC(=O)	H	Cl
H	H	$CH_3S(O)_2$	H	Cl
H	CH_3	$CH_3S(O)_2$	H	Cl
CH_3	CH_3	$CH_3S(O)_2$	H	Cl
H	H	$CH_3CH_2S(O)_2$	H	Cl
H	CH_3	$CH_3CH_2S(O)_2$	H	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	H	Cl
H	H	$CH_3CH_2CH_2S(O)_2$	H	Cl
H	CH_3	$CH_3CH_2CH_2S(O)_2$	H	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	H	Cl
H	H	$PhS(O)_2$	H	Cl
H	CH_3	$PhS(O)_2$	H	Cl
CH_3	CH_3	$PhS(O)_2$	H	Cl
H	H	4-CH_3PhS(O)$_2$	H	Cl

H	CH_3	4-CH_3PhS(O)$_2$	H	Cl
CH_3	CH_3	4-CH_3PhS(O)$_2$	H	Cl
H	H	PhC(=O)	CH_3	Cl
H	CH_3	PhC(=O)	CH_3	Cl
CH_3	CH_3	PhC(=O)	CH_3	Cl
H	H	PhC(=O)CH_2	CH_3	Cl
H	CH_3	PhC(=O)CH_2	CH_3	Cl
CH_3	CH_3	PhC(=O)CH_2	CH_3	Cl
H	H	4-CH_3PhC(=O)	CH_3	Cl
H	CH_3	4-CH_3PhC(=O)	CH_3	Cl
CH_3	CH_3	4-CH_3PhC(=O)	CH_3	Cl
H	H	CH_3S(O)$_2$	CH_3	Cl
H	CH_3	CH_3S(O)$_2$	CH_3	Cl
CH_3	CH_3	CH_3S(O)$_2$	CH_3	Cl
H	H	CH_3CH_2S(O)$_2$	CH_3	Cl
H	CH_3	CH_3CH_2S(O)$_2$	CH_3	Cl
CH_3	CH_3	CH_3CH_2S(O)$_2$	CH_3	Cl
H	H	$CH_3CH_2CH_2$S(O)$_2$	CH_3	Cl
H	CH_3	$CH_3CH_2CH_2$S(O)$_2$	CH_3	Cl
CH_3	CH_3	$CH_3CH_2CH_2$S(O)$_2$	CH_3	Cl
H	H	PhS(O)$_2$	CH_3	Cl
H	CH_3	PhS(O)$_2$	CH_3	Cl
CH_3	CH_3	PhS(O)$_2$	CH_3	Cl
H	H	4-CH_3PhS(O)$_2$	CH_3	Cl
H	CH_3	4-CH_3PhS(O)$_2$	CH_3	Cl
CH_3	CH_3	4-CH_3PhS(O)$_2$	CH_3	Cl
H	H	PhC(=O)	CH_3CH_2	Cl
H	CH_3	PhC(=O)	CH_3CH_2	Cl
CH_3	CH_3	PhC(=O)	CH_3CH_2	Cl
H	H	PhC(=O)CH_2	CH_3CH_2	Cl
H	CH_3	PhC(=O)CH_2	CH_3CH_2	Cl
CH_3	CH_3	PhC(=O)CH_2	CH_3CH_2	Cl
H	H	4-CH_3PhC(=O)	CH_3CH_2	Cl
H	CH_3	4-CH_3PhC(=O)	CH_3CH_2	Cl
CH_3	CH_3	4-CH_3PhC(=O)	CH_3CH_2	Cl
H	H	CH_3S(O)$_2$	CH_3CH_2	Cl
H	CH_3	CH_3S(O)$_2$	CH_3CH_2	Cl
CH_3	CH_3	CH_3S(O)$_2$	CH_3CH_2	Cl

H	H	$CH_3CH_2S(O)_2$	CH_3CH_2	Cl
H	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	Cl
H	H	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	Cl
H	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	Cl
H	H	$PhS(O)_2$	CH_3CH_2	Cl
H	CH_3	$PhS(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$PhS(O)_2$	CH_3CH_2	Cl
H	H	4-$CH_3PhS(O)_2$	CH_3CH_2	Cl
H	CH_3	4-$CH_3PhS(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	4-$CH_3PhS(O)_2$	CH_3CH_2	Cl
H	H	PhC(=O)	$CH_3CH_2CH_2$	Cl
H	CH_3	PhC(=O)	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	PhC(=O)	$CH_3CH_2CH_2$	Cl
H	H	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	Cl
H	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	Cl
H	H	4-$CH_3PhC(=O)$	$CH_3CH_2CH_2$	Cl
H	CH_3	4-$CH_3PhC(=O)$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	4-$CH_3PhC(=O)$	$CH_3CH_2CH_2$	Cl
H	H	$CH_3S(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	Cl
H	H	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
H	H	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
H	H	$PhS(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	Cl
H	H	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	Cl

Table 2



R^a	R^b	R^c	R^{17}	R^{18}
H	CH_3CH_2	PhC(=O)	H	H
CH_3	CH_3	PhC(=O)	H	H
H	CH_3CH_2	4-CH_3PhC(=O)	H	H
CH_3	CH_3	4-CH_3PhC(=O)	H	H
H	CH_3CH_2	$CH_3S(O)_2$	H	H
CH_3	CH_3	$CH_3S(O)_2$	H	H
H	CH_3CH_2	$CH_3CH_2S(O)_2$	H	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	H	H
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	H	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	H	H
H	CH_3CH_2	$PhS(O)_2$	H	H
CH_3	CH_3	$PhS(O)_2$	H	H
H	CH_3CH_2	4-CH_3PhS(O)$_2$	H	H
CH_3	CH_3	4-CH_3PhS(O)$_2$	H	H
H	CH_3CH_2	PhC(=O)	CH_3	H
CH_3	CH_3	PhC(=O)	CH_3	H
H	CH_3CH_2	4-CH_3PhC(=O)	CH_3	H
CH_3	CH_3	4-CH_3PhC(=O)	CH_3	H
H	CH_3CH_2	$CH_3S(O)_2$	CH_3	H
CH_3	CH_3	$CH_3S(O)_2$	CH_3	H
H	CH_3CH_2	$CH_3CH_2S(O)_2$	CH_3	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3	H
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	CH_3	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	H
H	CH_3CH_2	$PhS(O)_2$	CH_3	H
CH_3	CH_3	$PhS(O)_2$	CH_3	H
H	CH_3CH_2	4-CH_3PhS(O)$_2$	CH_3	H
CH_3	CH_3	4-CH_3PhS(O)$_2$	CH_3	H
H	CH_3CH_2	PhC(=O)	CH_3CH_2	H

CH_3	CH_3	PhC(=O)	CH_3CH_2	H
H	CH_3CH_2	4-CH_3PhC(=O)	CH_3CH_2	H
CH_3	CH_3	4-CH_3PhC(=O)	CH_3CH_2	H
H	CH_3CH_2	$CH_3S(O)_2$	CH_3CH_2	H
CH_3	CH_3	$CH_3S(O)_2$	CH_3CH_2	H
H	CH_3CH_2	$CH_3CH_2S(O)_2$	CH_3CH_2	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	H
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	H
H	CH_3CH_2	$PhS(O)_2$	CH_3CH_2	H
CH_3	CH_3	$PhS(O)_2$	CH_3CH_2	H
H	CH_3CH_2	4-CH_3PhS(O)$_2$	CH_3CH_2	H
CH_3	CH_3	4-CH_3PhS(O)$_2$	CH_3CH_2	H
H	CH_3CH_2	PhC(=O)	$CH_3CH_2CH_2$	H
CH_3	CH_3	PhC(=O)	$CH_3CH_2CH_2$	H
H	CH_3CH_2	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	H
CH_3	CH_3	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	H
H	CH_3CH_2	$CH_3S(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3CH_2	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3CH_2	$PhS(O)_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	H
H	CH_3CH_2	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	H
CH_3	CH_3	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	H
H	CH_3CH_2	PhC(=O)	H	CH_3
CH_3	CH_3	PhC(=O)	H	CH_3
H	CH_3CH_2	4-CH_3PhC(=O)	H	CH_3
CH_3	CH_3	4-CH_3PhC(=O)	H	CH_3
H	CH_3CH_2	$CH_3S(O)_2$	H	CH_3
CH_3	CH_3	$CH_3S(O)_2$	H	CH_3
H	CH_3CH_2	$CH_3CH_2S(O)_2$	H	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	H	CH_3
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	H	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	H	CH_3
H	CH_3CH_2	$PhS(O)_2$	H	CH_3

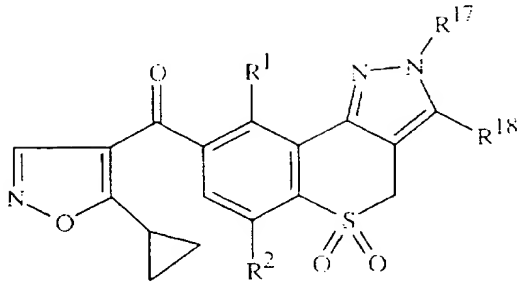
CH_3	CH_3	$PhS(O)_2$	H	CH_3
H	CH_3CH_2	4-$CH_3PhS(O)_2$	H	CH_3
CH_3	CH_3	4-$CH_3PhS(O)_2$	H	CH_3
H	CH_3CH_2	PhC(=O)	CH_3	CH_3
CH_3	CH_3	PhC(=O)	CH_3	CH_3
H	CH_3CH_2	4-CH_3PhC(=O)	CH_3	CH_3
CH_3	CH_3	4-CH_3PhC(=O)	CH_3	CH_3
H	CH_3CH_2	$CH_3S(O)_2$	CH_3	CH_3
CH_3	CH_3	$CH_3S(O)_2$	CH_3	CH_3
H	CH_3CH_2	$CH_3CH_2S(O)_2$	CH_3	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3	CH_3
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	CH_3	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	CH_3
H	CH_3CH_2	$PhS(O)_2$	CH_3	CH_3
CH_3	CH_3	$PhS(O)_2$	CH_3	CH_3
H	CH_3CH_2	4-$CH_3PhS(O)_2$	CH_3	CH_3
CH_3	CH_3	4-$CH_3PhS(O)_2$	CH_3	CH_3
H	CH_3CH_2	PhC(=O)	CH_3CH_2	CH_3
CH_3	CH_3	PhC(=O)	CH_3CH_2	CH_3
H	CH_3CH_2	4-CH_3PhC(=O)	CH_3CH_2	CH_3
CH_3	CH_3	4-CH_3PhC(=O)	CH_3CH_2	CH_3
H	CH_3CH_2	$CH_3S(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$CH_3S(O)_2$	CH_3CH_2	CH_3
H	CH_3CH_2	$CH_3CH_2S(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	CH_3
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	CH_3
H	CH_3CH_2	$PhS(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	$PhS(O)_2$	CH_3CH_2	CH_3
H	CH_3CH_2	4-$CH_3PhS(O)_2$	CH_3CH_2	CH_3
CH_3	CH_3	4-$CH_3PhS(O)_2$	CH_3CH_2	CH_3
H	CH_3CH_2	PhC(=O)	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	PhC(=O)	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	$CH_3S(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3

CH_3	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	$PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	4-$CH_3PhS(O)_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	PhC(=O)	H	Cl
CH_3	CH_3	PhC(=O)	H	Cl
H	CH_3CH_2	4-CH_3PhC(=O)	H	Cl
CH_3	CH_3	4-CH_3PhC(=O)	H	Cl
H	CH_3CH_2	$CH_3S(O)_2$	H	Cl
CH_3	CH_3	$CH_3S(O)_2$	H	Cl
H	CH_3CH_2	$CH_3CH_2S(O)_2$	H	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	H	Cl
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	H	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	H	Cl
H	CH_3CH_2	$PhS(O)_2$	H	Cl
CH_3	CH_3	$PhS(O)_2$	H	Cl
H	CH_3CH_2	4-$CH_3PhS(O)_2$	H	Cl
CH_3	CH_3	4-$CH_3PhS(O)_2$	H	Cl
H	CH_3CH_2	PhC(=O)	CH_3	Cl
CH_3	CH_3	PhC(=O)	CH_3	Cl
H	CH_3CH_2	4-CH_3PhC(=O)	CH_3	Cl
CH_3	CH_3	4-CH_3PhC(=O)	CH_3	Cl
H	CH_3CH_2	$CH_3S(O)_2$	CH_3	Cl
CH_3	CH_3	$CH_3S(O)_2$	CH_3	Cl
H	CH_3CH_2	$CH_3CH_2S(O)_2$	CH_3	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3	Cl
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	CH_3	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3	Cl
H	CH_3CH_2	$PhS(O)_2$	CH_3	Cl
CH_3	CH_3	$PhS(O)_2$	CH_3	Cl
H	CH_3CH_2	4-$CH_3PhS(O)_2$	CH_3	Cl
CH_3	CH_3	4-$CH_3PhS(O)_2$	CH_3	Cl
H	CH_3CH_2	PhC(=O)	CH_3CH_2	Cl
CH_3	CH_3	PhC(=O)	CH_3CH_2	Cl
H	CH_3CH_2	4-CH_3PhC(=O)	CH_3CH_2	Cl

CH_3	CH_3	4-CH_3PhC(=O)	CH_3CH_2	Cl
H	CH_3CH_2	$CH_3S(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$CH_3S(O)_2$	CH_3CH_2	Cl
H	CH_3CH_2	$CH_3CH_2S(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	CH_3CH_2	Cl
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	CH_3CH_2	Cl
H	CH_3CH_2	$PhS(O)_2$	CH_3CH_2	Cl
CH_3	CH_3	$PhS(O)_2$	CH_3CH_2	Cl
H	CH_3CH_2	4-CH_3PhS(O)$_2$	CH_3CH_2	Cl
CH_3	CH_3	4-CH_3PhS(O)$_2$	CH_3CH_2	Cl
H	CH_3CH_2	PhC(=O)	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	PhC(=O)	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	4-CH_3PhC(=O)	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	$CH_3S(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3S(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3CH_2CH_2S(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	$PhS(O)_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$PhS(O)_2$	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	4-CH_3PhS(O)$_2$	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	PhC(=O)CH_2	H	H
CH_3	CH_3	PhC(=O)CH_2	H	H
H	CH_3CH_2	PhC(=O)CH_2	CH_3	H
CH_3	CH_3	PhC(=O)CH_2	CH_3	H
H	CH_3CH_2	PhC(=O)CH_2	CH_3CH_2	H
CH_3	CH_3	PhC(=O)CH_2	CH_3CH_2	H
H	CH_3CH_2	PhC(=O)CH_2	$CH_3CH_2CH_2$	H
CH_3	CH_3	PhC(=O)CH_2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	PhC(=O)CH_2	H	CH_3
CH_3	CH_3	PhC(=O)CH_2	H	CH_3
H	CH_3CH_2	PhC(=O)CH_2	CH_3	CH_3
CH_3	CH_3	PhC(=O)CH_2	CH_3	CH_3
H	CH_3CH_2	PhC(=O)CH_2	CH_3CH_2	CH_3

CH_3	CH_3	$PhC(=O)CH_2$	CH_3CH_2	CH_3
H	CH_3CH_2	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	$PhC(=O)CH_2$	H	Cl
CH_3	CH_3	$PhC(=O)CH_2$	H	Cl
H	CH_3CH_2	$PhC(=O)CH_2$	CH_3	Cl
CH_3	CH_3	$PhC(=O)CH_2$	CH_3	Cl
H	CH_3CH_2	$PhC(=O)CH_2$	CH_3CH_2	Cl
CH_3	CH_3	$PhC(=O)CH_2$	CH_3CH_2	Cl
H	CH_3CH_2	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$PhC(=O)CH_2$	$CH_3CH_2CH_2$	Cl

Table 3

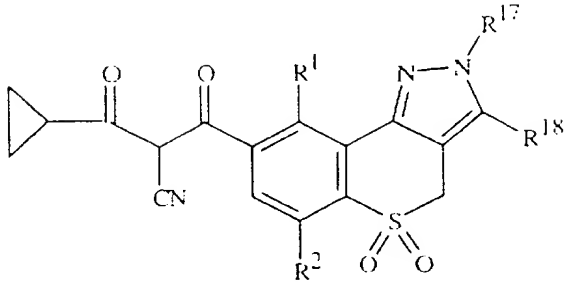


R^1	R^2	R^{17}	R^{18}
H	H	H	H
CH_3	H	H	H
CH_3	CH_3	H	H
Cl	H	H	H
Cl	CH_3	H	H
Cl	Cl	H	H
H	H	CH_3	H
CH_3	H	CH_3	H
CH_3	CH_3	CH_3	H
Cl	H	CH_3	H
Cl	CH_3	CH_3	H
Cl	Cl	CH_3	H
H	H	CH_3CH_2	H
CH_3	H	CH_3CH_2	H
CH_3	CH_3	CH_3CH_2	H
Cl	H	CH_3CH_2	H
Cl	CH_3	CH_3CH_2	H

Cl	Cl	$CH_3CH_2CH_2$	H
H	H	$CH_3CH_2CH_2$	H
CH_3	H	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3CH_2CH_2$	H
Cl	H	$CH_3CH_2CH_2$	H
Cl	CH_3	$CH_3CH_2CH_2$	H
Cl	Cl	$CH_3CH_2CH_2$	H
H	H	H	CH_3
CH_3	H	H	CH_3
CH_3	CH_3	H	CH_3
Cl	H	H	CH_3
Cl	CH_3	H	CH_3
Cl	Cl	H	CH_3
H	H	CH_3	CH_3
CH_3	H	CH_3	CH_3
CH_3	CH_3	CH_3	CH_3
Cl	H	CH_3	CH_3
Cl	CH_3	CH_3	CH_3
Cl	Cl	CH_3	CH_3
H	H	CH_3CH_2	CH_3
CH_3	H	CH_3CH_2	CH_3
CH_3	CH_3	CH_3CH_2	CH_3
Cl	H	CH_3CH_2	CH_3
Cl	CH_3	CH_3CH_2	CH_3
Cl	Cl	$CH_3CH_2CH_2$	CH_3
H	H	$CH_3CH_2CH_2$	CH_3
CH_3	H	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3CH_2CH_2$	CH_3
Cl	H	$CH_3CH_2CH_2$	CH_3
Cl	CH_3	$CH_3CH_2CH_2$	CH_3
Cl	Cl	$CH_3CH_2CH_2$	CH_3
H	H	H	Cl
CH_3	H	H	Cl
CH_3	CH_3	H	Cl
Cl	H	H	Cl
Cl	CH_3	H	Cl
Cl	Cl	H	Cl
H	H	CH_3	Cl

CH_3	H	CH_3	Cl
CH_3	CH_3	CH_3	Cl
Cl	H	CH_3	Cl
Cl	CH_3	CH_3	Cl
Cl	Cl	CH_3	Cl
H	H	CH_3CH_2	Cl
CH_3	H	CH_3CH_2	Cl
CH_3	CH_3	CH_3CH_2	Cl
Cl	H	CH_3CH_2	Cl
Cl	CH_3	CH_3CH_2	Cl
Cl	Cl	$CH_3CH_2CH_2$	Cl
H	H	$CH_3CH_2CH_2$	Cl
CH_3	H	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3CH_2CH_2$	Cl
Cl	H	$CH_3CH_2CH_2$	Cl
Cl	CH_3	$CH_3CH_2CH_2$	Cl
Cl	Cl	$CH_3CH_2CH_2$	Cl

Table 4

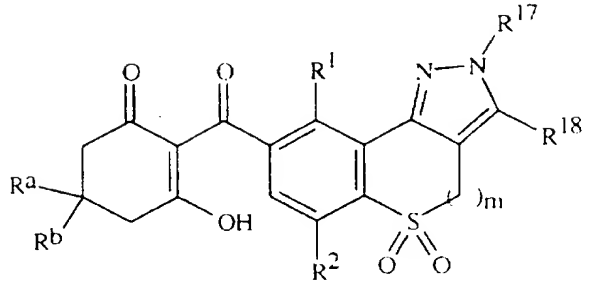


R^1	R^2	R^{17}	R^{18}
H	H	H	H
CH_3	H	H	H
CH_3	CH_3	H	H
Cl	H	H	H
Cl	CH_3	H	H
Cl	Cl	H	H
H	H	CH_3	H
CH_3	H	CH_3	H
CH_3	CH_3	CH_3	H
Cl	H	CH_3	H

Cl	CH_3	CH_3	H
Cl	Cl	CH_3	H
H	H	CH_3CH_2	H
CH_3	H	CH_3CH_2	H
CH_3	CH_3	CH_3CH_2	H
Cl	H	CH_3CH_2	H
Cl	CH_3	CH_3CH_2	H
Cl	Cl	$CH_3CH_2CH_2$	H
H	H	$CH_3CH_2CH_2$	H
CH_3	H	$CH_3CH_2CH_2$	H
CH_3	CH_3	$CH_3CH_2CH_2$	H
Cl	H	$CH_3CH_2CH_2$	H
Cl	CH_3	$CH_3CH_2CH_2$	H
Cl	Cl	$CH_3CH_2CH_2$	H
H	H	H	CH_3
CH_3	H	H	CH_3
CH_3	CH_3	H	CH_3
Cl	H	H	CH_3
Cl	CH_3	H	CH_3
Cl	Cl	H	CH_3
H	H	CH_3	CH_3
CH_3	H	CH_3	CH_3
CH_3	CH_3	CH_3	CH_3
Cl	H	CH_3	CH_3
Cl	CH_3	CH_3	CH_3
Cl	Cl	CH_3	CH_3
H	H	CH_3CH_2	CH_3
CH_3	H	CH_3CH_2	CH_3
CH_3	CH_3	CH_3CH_2	CH_3
Cl	H	CH_3CH_2	CH_3
Cl	CH_3	CH_3CH_2	CH_3
Cl	Cl	$CH_3CH_2CH_2$	CH_3
H	H	$CH_3CH_2CH_2$	CH_3
CH_3	H	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	$CH_3CH_2CH_2$	CH_3
Cl	H	$CH_3CH_2CH_2$	CH_3
Cl	CH_3	$CH_3CH_2CH_2$	CH_3
Cl	Cl	$CH_3CH_2CH_2$	CH_3

H	H	H	Cl
CH_3	H	H	Cl
CH_3	CH_3	H	Cl
Cl	H	H	Cl
Cl	CH_3	H	Cl
Cl	Cl	H	Cl
H	H	CH_3	Cl
CH_3	H	CH_3	Cl
CH_3	CH_3	CH_3	Cl
Cl	H	CH_3	Cl
Cl	CH_3	CH_3	Cl
Cl	Cl	CH_3	Cl
H	H	CH_3CH_2	Cl
CH_3	H	CH_3CH_2	Cl
CH_3	CH_3	CH_3CH_2	Cl
Cl	H	CH_3CH_2	Cl
Cl	CH_3	CH_3CH_2	Cl
Cl	Cl	$CH_3CH_2CH_2$	Cl
H	H	$CH_3CH_2CH_2$	Cl
CH_3	H	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	$CH_3CH_2CH_2$	Cl
Cl	H	$CH_3CH_2CH_2$	Cl
Cl	CH_3	$CH_3CH_2CH_2$	Cl
Cl	Cl	$CH_3CH_2CH_2$	Cl

Table 5



R^a	R^b	R^1	R^2	m	R^{17}	R^{18}
H	H	H	H	1	H	H
CH_3	H	H	H	1	H	H
CH_3	CH_3	H	H	1	H	H
H	H	CH_3	H	1	H	H

CH_3	H	CH_3	H	1	H	H
CH_3	CH_3	CH_3	H	1	H	H
H	H	Cl	H	1	H	H
CH_3	H	Cl	H	1	H	H
CH_3	CH_3	Cl	H	1	H	H
H	H	H	CH_3	1	H	H
CH_3	H	H	CH_3	1	H	H
CH_3	CH_3	H	CH_3	1	H	H
H	H	CH_3	CH_3	1	H	H
CH_3	H	CH_3	CH_3	1	H	H
CH_3	CH_3	CH_3	CH_3	1	H	H
H	H	Cl	CH_3	1	H	H
CH_3	H	Cl	CH_3	1	H	H
CH_3	CH_3	Cl	CH_3	1	H	H
H	H	H	Cl	1	H	H
CH_3	H	H	Cl	1	H	H
CH_3	CH_3	H	Cl	1	H	H
H	H	CH_3	Cl	1	H	H
CH_3	H	CH_3	Cl	1	H	H
CH_3	CH_3	CH_3	Cl	1	H	H
H	H	Cl	Cl	1	H	H
CH_3	H	Cl	Cl	1	H	H
CH_3	CH_3	Cl	Cl	1	H	H
H	H	H	H	1	CH_3	H
CH_3	H	H	H	1	CH_3	H
CH_3	CH_3	H	H	1	CH_3	H
H	H	CH_3	H	1	CH_3	H
CH_3	H	CH_3	H	1	CH_3	H
CH_3	CH_3	CH_3	H	1	CH_3	H
H	H	Cl	H	1	CH_3	H
CH_3	H	Cl	H	1	CH_3	H
CH_3	CH_3	Cl	H	1	CH_3	H
H	H	H	CH_3	1	CH_3	H
CH_3	H	H	CH_3	1	CH_3	H
CH_3	CH_3	H	CH_3	1	CH_3	H
H	H	CH_3	CH_3	1	CH_3	H
CH_3	H	CH_3	CH_3	1	CH_3	H
CH_3	CH_3	CH_3	CH_3	1	CH_3	H

H	H	Cl	CH_3	I	CH_3	H
CH_3	H	Cl	CH_3	I	CH_3	H
CH_3	CH_3	Cl	CH_3	I	CH_3	H
H	H	H	Cl	I	CH_3	H
CH_3	H	H	Cl	I	CH_3	H
CH_3	CH_3	H	Cl	I	CH_3	H
H	H	CH_3	Cl	I	CH_3	H
CH_3	H	CH_3	Cl	I	CH_3	H
CH_3	CH_3	CH_3	Cl	I	CH_3	H
H	H	Cl	Cl	I	CH_3	H
CH_3	H	Cl	Cl	I	CH_3	H
CH_3	CH_3	Cl	Cl	I	CH_3	H
H	H	H	H	I	CH_3CH_2	H
CH_3	H	H	H	I	CH_3CH_2	H
CH_3	CH_3	H	H	I	CH_3CH_2	H
H	H	CH_3	H	I	CH_3CH_2	H
CH_3	H	CH_3	H	I	CH_3CH_2	H
CH_3	CH_3	CH_3	H	I	CH_3CH_2	H
H	H	Cl	H	I	CH_3CH_2	H
CH_3	H	Cl	H	I	CH_3CH_2	H
CH_3	CH_3	Cl	H	I	CH_3CH_2	H
H	H	H	CH_3	I	CH_3CH_2	H
CH_3	H	H	CH_3	I	CH_3CH_2	H
CH_3	CH_3	H	CH_3	I	CH_3CH_2	H
H	H	CH_3	CH_3	I	CH_3CH_2	H
CH_3	H	CH_3	CH_3	I	CH_3CH_2	H
CH_3	CH_3	CH_3	CH_3	I	CH_3CH_2	H
H	H	Cl	CH_3	I	CH_3CH_2	H
CH_3	H	Cl	CH_3	I	CH_3CH_2	H
CH_3	CH_3	Cl	CH_3	I	CH_3CH_2	H
H	H	H	Cl	I	CH_3CH_2	H
CH_3	H	H	Cl	I	CH_3CH_2	H
CH_3	CH_3	H	Cl	I	CH_3CH_2	H
H	H	CH_3	Cl	I	CH_3CH_2	H
CH_3	H	CH_3	Cl	I	CH_3CH_2	H
CH_3	CH_3	CH_3	Cl	I	CH_3CH_2	H
H	H	Cl	Cl	I	CH_3CH_2	H
CH_3	H	Cl	Cl	I	CH_3CH_2	H

CH_3	CH_3	Cl	Cl	I	CH_3CH_2	H
H	H	H	H	I	$CH_3CH_2CH_2$	H
CH_3	H	H	H	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	H	H	I	$CH_3CH_2CH_2$	H
H	H	CH_3	H	I	$CH_3CH_2CH_2$	H
CH_3	H	CH_3	H	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	CH_3	H	I	$CH_3CH_2CH_2$	H
H	H	Cl	H	I	$CH_3CH_2CH_2$	H
CH_3	H	Cl	H	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	Cl	H	I	$CH_3CH_2CH_2$	H
H	H	H	CH_3	I	$CH_3CH_2CH_2$	H
CH_3	H	H	CH_3	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	H	CH_3	I	$CH_3CH_2CH_2$	H
H	H	CH_3	CH_3	I	$CH_3CH_2CH_2$	H
CH_3	H	CH_3	CH_3	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	CH_3	CH_3	I	$CH_3CH_2CH_2$	H
H	H	Cl	CH_3	I	$CH_3CH_2CH_2$	H
CH_3	H	Cl	CH_3	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	Cl	CH_3	I	$CH_3CH_2CH_2$	H
H	H	H	Cl	I	$CH_3CH_2CH_2$	H
CH_3	H	H	Cl	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	H	Cl	I	$CH_3CH_2CH_2$	H
H	H	CH_3	Cl	I	$CH_3CH_2CH_2$	H
CH_3	H	CH_3	Cl	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	CH_3	Cl	I	$CH_3CH_2CH_2$	H
H	H	Cl	Cl	I	$CH_3CH_2CH_2$	H
CH_3	H	Cl	Cl	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	Cl	Cl	I	$CH_3CH_2CH_2$	H
H	H	H	H	I	H	CH_3
CH_3	H	H	H	I	H	CH_3
CH_3	CH_3	H	H	I	H	CH_3
H	H	CH_3	H	I	H	CH_3
CH_3	H	CH_3	H	I	H	CH_3
CH_3	CH_3	CH_3	H	I	H	CH_3
H	H	Cl	H	I	H	CH_3
CH_3	H	Cl	H	I	H	CH_3
CH_3	CH_3	Cl	H	I	H	CH_3
H	H	H	CH_3	I	H	CH_3

CH_3	H	H	CH_3	I	H	CH_3
CH_3	CH_3	H	CH_3	I	H	CH_3
H	H	CH_3	CH_3	I	H	CH_3
CH_3	H	CH_3	CH_3	I	H	CH_3
CH_3	CH_3	CH_3	CH_3	I	H	CH_3
H	H	Cl	CH_3	I	H	CH_3
CH_3	H	Cl	CH_3	I	H	CH_3
CH_3	CH_3	Cl	CH_3	I	H	CH_3
H	H	H	Cl	I	H	CH_3
CH_3	H	H	Cl	I	H	CH_3
CH_3	CH_3	H	Cl	I	H	CH_3
H	H	CH_3	Cl	I	H	CH_3
CH_3	H	CH_3	Cl	I	H	CH_3
CH_3	CH_3	CH_3	Cl	I	H	CH_3
H	H	Cl	Cl	I	H	CH_3
CH_3	H	Cl	Cl	I	H	CH_3
CH_3	CH_3	Cl	Cl	I	H	CH_3
H	H	H	H	I	CH_3	CH_3
CH_3	H	H	H	I	CH_3	CH_3
CH_3	CH_3	H	H	I	CH_3	CH_3
H	H	CH_3	H	I	CH_3	CH_3
CH_3	H	CH_3	H	I	CH_3	CH_3
CH_3	CH_3	CH_3	H	I	CH_3	CH_3
H	H	Cl	H	I	CH_3	CH_3
CH_3	H	Cl	H	I	CH_3	CH_3
CH_3	CH_3	Cl	H	I	CH_3	CH_3
H	H	H	CH_3	I	CH_3	CH_3
CH_3	H	H	CH_3	I	CH_3	CH_3
CH_3	CH_3	H	CH_3	I	CH_3	CH_3
H	H	CH_3	CH_3	I	CH_3	CH_3
CH_3	H	CH_3	CH_3	I	CH_3	CH_3
CH_3	CH_3	CH_3	CH_3	I	CH_3	CH_3
H	H	Cl	CH_3	I	CH_3	CH_3
CH_3	H	Cl	CH_3	I	CH_3	CH_3
CH_3	CH_3	Cl	CH_3	I	CH_3	CH_3
H	H	H	Cl	I	CH_3	CH_3
CH_3	H	H	Cl	I	CH_3	CH_3
CH_3	CH_3	H	Cl	I	CH_3	CH_3

H	H	CH_3	Cl	1	CH_3	CH_3
CH_3	H	CH_3	Cl	1	CH_3	CH_3
CH_3	CH_3	CH_3	Cl	1	CH_3	CH_3
H	H	Cl	Cl	1	CH_3	CH_3
CH_3	H	Cl	Cl	1	CH_3	CH_3
CH_3	CH_3	Cl	Cl	1	CH_3	CH_3
H	H	H	H	1	CH_3CH_2	CH_3
CH_3	H	H	H	1	CH_3CH_2	CH_3
CH_3	CH_3	H	H	1	CH_3CH_2	CH_3
H	H	CH_3	H	1	CH_3CH_2	CH_3
CH_3	H	CH_3	H	1	CH_3CH_2	CH_3
CH_3	CH_3	CH_3	H	1	CH_3CH_2	CH_3
H	H	Cl	H	1	CH_3CH_2	CH_3
CH_3	H	Cl	H	1	CH_3CH_2	CH_3
CH_3	CH_3	Cl	H	1	CH_3CH_2	CH_3
H	H	H	CH_3	1	CH_3CH_2	CH_3
CH_3	H	H	CH_3	1	CH_3CH_2	CH_3
CH_3	CH_3	H	CH_3	1	CH_3CH_2	CH_3
H	H	CH_3	CH_3	1	CH_3CH_2	CH_3
CH_3	H	CH_3	CH_3	1	CH_3CH_2	CH_3
CH_3	CH_3	CH_3	CH_3	1	CH_3CH_2	CH_3
H	H	Cl	CH_3	1	CH_3CH_2	CH_3
CH_3	H	Cl	CH_3	1	CH_3CH_2	CH_3
CH_3	CH_3	Cl	CH_3	1	CH_3CH_2	CH_3
H	H	H	Cl	1	CH_3CH_2	CH_3
CH_3	H	H	Cl	1	CH_3CH_2	CH_3
CH_3	CH_3	H	Cl	1	CH_3CH_2	CH_3
H	H	CH_3	Cl	1	CH_3CH_2	CH_3
CH_3	H	CH_3	Cl	1	CH_3CH_2	CH_3
CH_3	CH_3	CH_3	Cl	1	CH_3CH_2	CH_3
H	H	Cl	Cl	1	CH_3CH_2	CH_3
CH_3	H	Cl	Cl	1	CH_3CH_2	CH_3
CH_3	CH_3	Cl	Cl	1	CH_3CH_2	CH_3
H	H	H	H	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	H	H	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	H	H	1	$CH_3CH_2CH_2$	CH_3
H	H	CH_3	H	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	CH_3	H	1	$CH_3CH_2CH_2$	CH_3

CH_3	CH_3	CH_3	H	1	$CH_3CH_2CH_2$	CH_3
H	H	Cl	H	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	Cl	H	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	Cl	H	1	$CH_3CH_2CH_2$	CH_3
H	H	H	CH_3	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	H	CH_3	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	H	CH_3	1	$CH_3CH_2CH_2$	CH_3
H	H	CH_3	CH_3	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	CH_3	CH_3	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	CH_3	CH_3	1	$CH_3CH_2CH_2$	CH_3
H	H	Cl	CH_3	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	Cl	CH_3	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	CH_3
H	H	H	Cl	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	H	Cl	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	H	Cl	1	$CH_3CH_2CH_2$	CH_3
H	H	CH_3	Cl	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	CH_3	Cl	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	CH_3	Cl	1	$CH_3CH_2CH_2$	CH_3
H	H	Cl	Cl	1	$CH_3CH_2CH_2$	CH_3
CH_3	H	Cl	Cl	1	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	Cl	Cl	1	$CH_3CH_2CH_2$	CH_3
H	H	H	H	1	H	Cl
CH_3	H	H	H	1	H	Cl
CH_3	CH_3	H	H	1	H	Cl
H	H	CH_3	H	1	H	Cl
CH_3	H	CH_3	H	1	H	Cl
CH_3	CH_3	CH_3	H	1	H	Cl
H	H	Cl	H	1	H	Cl
CH_3	H	Cl	H	1	H	Cl
CH_3	CH_3	Cl	H	1	H	Cl
H	H	H	CH_3	1	H	Cl
CH_3	H	H	CH_3	1	H	Cl
CH_3	CH_3	H	CH_3	1	H	Cl
H	H	CH_3	CH_3	1	H	Cl
CH_3	H	CH_3	CH_3	1	H	Cl
CH_3	CH_3	CH_3	CH_3	1	H	Cl
H	H	Cl	CH_3	1	H	Cl

CH_3	H	Cl	CH_3	1	H	Cl
CH_3	CH_3	Cl	CH_3	1	H	Cl
H	H	H	Cl	1	H	Cl
CH_3	H	H	Cl	1	H	Cl
CH_3	CH_3	H	Cl	1	H	Cl
H	H	CH_3	Cl	1	H	Cl
CH_3	H	CH_3	Cl	1	H	Cl
CH_3	CH_3	CH_3	Cl	1	H	Cl
H	H	Cl	Cl	1	H	Cl
CH_3	H	Cl	Cl	1	H	Cl
CH_3	CH_3	Cl	Cl	1	H	Cl
H	H	H	H	1	CH_3	Cl
CH_3	H	H	H	1	CH_3	Cl
CH_3	CH_3	H	H	1	CH_3	Cl
H	H	CH_3	H	1	CH_3	Cl
CH_3	H	CH_3	H	1	CH_3	Cl
CH_3	CH_3	CH_3	H	1	CH_3	Cl
H	H	Cl	H	1	CH_3	Cl
CH_3	H	Cl	H	1	CH_3	Cl
CH_3	CH_3	Cl	H	1	CH_3	Cl
H	H	H	CH_3	1	CH_3	Cl
CH_3	H	H	CH_3	1	CH_3	Cl
CH_3	CH_3	H	CH_3	1	CH_3	Cl
H	H	CH_3	CH_3	1	CH_3	Cl
CH_3	H	CH_3	CH_3	1	CH_3	Cl
CH_3	CH_3	CH_3	CH_3	1	CH_3	Cl
H	H	Cl	CH_3	1	CH_3	Cl
CH_3	H	Cl	CH_3	1	CH_3	Cl
CH_3	CH_3	Cl	CH_3	1	CH_3	Cl
H	H	H	Cl	1	CH_3	Cl
CH_3	H	H	Cl	1	CH_3	Cl
CH_3	CH_3	H	Cl	1	CH_3	Cl
H	H	CH_3	Cl	1	CH_3	Cl
CH_3	H	CH_3	Cl	1	CH_3	Cl
CH_3	CH_3	CH_3	Cl	1	CH_3	Cl
H	H	Cl	Cl	1	CH_3	Cl
CH_3	H	Cl	Cl	1	CH_3	Cl
CH_3	CH_3	Cl	Cl	1	CH_3	Cl

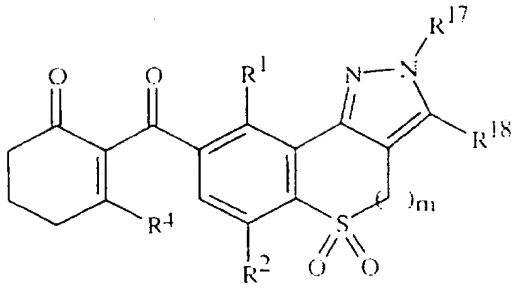
H	H	H	H	I	CH_3CH_2	Cl
CH_3	H	H	H	I	CH_3CH_2	Cl
CH_3	CH_3	H	H	I	CH_3CH_2	Cl
H	H	CH_3	H	I	CH_3CH_2	Cl
CH_3	H	CH_3	H	I	CH_3CH_2	Cl
CH_3	CH_3	CH_3	H	I	CH_3CH_2	Cl
H	H	Cl	H	I	CH_3CH_2	Cl
CH_3	H	Cl	H	I	CH_3CH_2	Cl
CH_3	CH_3	Cl	H	I	CH_3CH_2	Cl
H	H	H	CH_3	I	CH_3CH_2	Cl
CH_3	H	H	CH_3	I	CH_3CH_2	Cl
CH_3	CH_3	H	CH_3	I	CH_3CH_2	Cl
H	H	CH_3	CH_3	I	CH_3CH_2	Cl
CH_3	H	CH_3	CH_3	I	CH_3CH_2	Cl
CH_3	CH_3	CH_3	CH_3	I	CH_3CH_2	Cl
H	H	Cl	CH_3	I	CH_3CH_2	Cl
CH_3	H	Cl	CH_3	I	CH_3CH_2	Cl
CH_3	CH_3	Cl	CH_3	I	CH_3CH_2	Cl
H	H	H	Cl	I	CH_3CH_2	Cl
CH_3	H	H	Cl	I	CH_3CH_2	Cl
CH_3	CH_3	H	Cl	I	CH_3CH_2	Cl
H	H	CH_3	Cl	I	CH_3CH_2	Cl
CH_3	H	CH_3	Cl	I	CH_3CH_2	Cl
CH_3	CH_3	CH_3	Cl	I	CH_3CH_2	Cl
H	H	Cl	Cl	I	CH_3CH_2	Cl
CH_3	H	Cl	Cl	I	CH_3CH_2	Cl
CH_3	CH_3	Cl	Cl	I	CH_3CH_2	Cl
H	H	H	H	I	$CH_3CH_2CH_2$	Cl
CH_3	H	H	H	I	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	H	H	I	$CH_3CH_2CH_2$	Cl
H	H	CH_3	H	I	$CH_3CH_2CH_2$	Cl
CH_3	H	CH_3	H	I	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	CH_3	H	I	$CH_3CH_2CH_2$	Cl
H	H	Cl	H	I	$CH_3CH_2CH_2$	Cl
CH_3	H	Cl	H	I	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	Cl	H	I	$CH_3CH_2CH_2$	Cl
H	H	H	CH_3	I	$CH_3CH_2CH_2$	Cl
CH_3	H	H	CH_3	I	$CH_3CH_2CH_2$	Cl

CH_3	CH_3	H	CH_3	1	$CH_3CH_2CH_2$	Cl
H	H	CH_3	CH_3	1	$CH_3CH_2CH_2$	Cl
CH_3	H	CH_3	CH_3	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	CH_3	CH_3	1	$CH_3CH_2CH_2$	Cl
H	H	Cl	CH_3	1	$CH_3CH_2CH_2$	Cl
CH_3	H	Cl	CH_3	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	Cl
H	H	H	Cl	1	$CH_3CH_2CH_2$	Cl
CH_3	H	H	Cl	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	H	Cl	1	$CH_3CH_2CH_2$	Cl
H	H	CH_3	Cl	1	$CH_3CH_2CH_2$	Cl
CH_3	H	CH_3	Cl	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	CH_3	Cl	1	$CH_3CH_2CH_2$	Cl
H	H	Cl	Cl	1	$CH_3CH_2CH_2$	Cl
CH_3	H	Cl	Cl	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	Cl	Cl	1	$CH_3CH_2CH_2$	Cl
H	H	H	H	2	H	H
H	H	CH_3	H	2	H	H
H	H	Cl	H	2	H	H
H	H	CH_3	CH_3	2	H	H
H	H	Cl	CH_3	2	H	H
H	H	Cl	Cl	2	H	H
H	H	H	H	2	CH_3	H
H	H	CH_3	H	2	CH_3	H
H	H	Cl	H	2	CH_3	H
H	H	CH_3	CH_3	2	CH_3	H
H	H	Cl	CH_3	2	CH_3	H
H	H	Cl	Cl	2	CH_3	H
H	H	H	H	2	CH_2CH_3	H
H	H	CH_3	H	2	CH_2CH_3	H
H	H	Cl	H	2	CH_2CH_3	H
H	H	CH_3	CH_3	2	CH_2CH_3	H
H	H	Cl	CH_3	2	CH_2CH_3	H
H	H	Cl	Cl	2	CH_2CH_3	H
H	H	H	H	2	$CH_2CH_2CH_3$	H
H	H	CH_3	H	2	$CH_2CH_2CH_3$	H
H	H	Cl	H	2	$CH_2CH_2CH_3$	H
H	H	CH_3	CH_3	2	$CH_2CH_2CH_3$	H

H	H	Cl	CH_3	2	$CH_2CH_2CH_3$	H
H	H	Cl	Cl	2	$CH_2CH_2CH_3$	H
H	H	H	H	2	phenyl	H
H	H	CH_3	H	2	phenyl	H
H	H	Cl	H	2	phenyl	H
H	H	CH_3	CH_3	2	phenyl	H
H	H	Cl	CH_3	2	phenyl	H
H	H	Cl	Cl	2	phenyl	H
H	H	H	H	2	H	CH_3
H	H	CH_3	H	2	H	CH_3
H	H	Cl	H	2	H	CH_3
H	H	CH_3	CH_3	2	H	CH_3
H	H	Cl	CH_3	2	H	CH_3
H	H	Cl	Cl	2	H	CH_3
H	H	H	H	2	CH_3	CH_3
H	H	CH_3	H	2	CH_3	CH_3
H	H	Cl	H	2	CH_3	CH_3
H	H	CH_3	CH_3	2	CH_3	CH_3
H	H	Cl	CH_3	2	CH_3	CH_3
H	H	Cl	Cl	2	CH_3	CH_3
H	H	H	H	2	CH_2CH_3	CH_3
H	H	CH_3	H	2	CH_2CH_3	CH_3
H	H	Cl	H	2	CH_2CH_3	CH_3
H	H	CH_3	CH_3	2	CH_2CH_3	CH_3
H	H	Cl	CH_3	2	CH_2CH_3	CH_3
H	H	Cl	Cl	2	CH_2CH_3	CH_3
H	H	H	H	2	$CH_2CH_2CH_3$	CH_3
H	H	CH_3	H	2	$CH_2CH_2CH_3$	CH_3
H	H	Cl	H	2	$CH_2CH_2CH_3$	CH_3
H	H	CH_3	CH_3	2	$CH_2CH_2CH_3$	CH_3
H	H	Cl	CH_3	2	$CH_2CH_2CH_3$	CH_3
H	H	Cl	Cl	2	$CH_2CH_2CH_3$	CH_3
H	H	H	H	2	phenyl	CH_3
H	H	CH_3	H	2	phenyl	CH_3
H	H	Cl	H	2	phenyl	CH_3
H	H	CH_3	CH_3	2	phenyl	CH_3
H	H	Cl	CH_3	2	phenyl	CH_3
H	H	Cl	Cl	2	phenyl	CH_3

H	H	H	H	2	H	Cl
H	H	CH_3	H	2	H	Cl
H	H	Cl	H	2	H	Cl
H	H	CH_3	CH_3	2	H	Cl
H	H	Cl	CH_3	2	H	Cl
H	H	Cl	Cl	2	H	Cl
H	H	H	H	2	CH_3	Cl
H	H	CH_3	H	2	CH_3	Cl
H	H	Cl	H	2	CH_3	Cl
H	H	CH_3	CH_3	2	CH_3	Cl
H	H	Cl	CH_3	2	CH_3	Cl
H	H	Cl	Cl	2	CH_3	Cl
H	H	H	H	2	CH_2CH_3	Cl
H	H	CH_3	H	2	CH_2CH_3	Cl
H	H	Cl	H	2	CH_2CH_3	Cl
H	H	CH_3	CH_3	2	CH_2CH_3	Cl
H	H	Cl	CH_3	2	CH_2CH_3	Cl
H	H	Cl	Cl	2	CH_2CH_3	Cl
H	H	H	H	2	$CH_2CH_2CH_3$	Cl
H	H	CH_3	H	2	$CH_2CH_2CH_3$	Cl
H	H	Cl	H	2	$CH_2CH_2CH_3$	Cl
H	H	CH_3	CH_3	2	$CH_2CH_2CH_3$	Cl
H	H	Cl	CH_3	2	$CH_2CH_2CH_3$	Cl
H	H	Cl	Cl	2	$CH_2CH_2CH_3$	Cl
H	H	H	H	2	phenyl	Cl
H	H	CH_3	H	2	phenyl	Cl
H	H	Cl	H	2	phenyl	Cl
H	H	CH_3	CH_3	2	phenyl	Cl
H	H	Cl	CH_3	2	phenyl	Cl
H	H	Cl	Cl	2	phenyl	Cl

Table 6



R^4	R^1	R^2	m	R^{17}	R^{18}
SH	H	H	1	H	H
Cl	H	H	1	H	H
SH	CH_3	H	1	H	H
Cl	CH_3	H	1	H	H
SH	Cl	H	1	H	H
Cl	Cl	H	1	H	H
SH	CH_3	CH_3	1	H	H
Cl	CH_3	CH_3	1	H	H
SH	Cl	Cl	1	H	H
Cl	Cl	Cl	1	H	H
SH	H	H	2	H	H
Cl	H	H	2	H	H
SH	CH_3	H	2	H	H
Cl	CH_3	H	2	H	H
SH	Cl	H	2	H	H
Cl	Cl	H	2	H	H
SH	CH_3	CH_3	2	H	H
Cl	CH_3	CH_3	2	H	H
SH	Cl	Cl	2	H	H
Cl	Cl	Cl	2	H	H
SH	H	H	1	CH_3	H
Cl	H	H	1	CH_3	H
SH	CH_3	H	1	CH_3	H
Cl	CH_3	H	1	CH_3	H
SH	Cl	H	1	CH_3	H
Cl	Cl	H	1	CH_3	H
SH	CH_3	CH_3	1	CH_3	H
Cl	CH_3	CH_3	1	CH_3	H
SH	Cl	Cl	1	CH_3	H

Cl	Cl	Cl	1	CH_3	H
SH	H	H	2	CH_3	H
Cl	H	H	2	CH_3	H
SH	CH_3	H	2	CH_3	H
Cl	CH_3	H	2	CH_3	H
SH	Cl	H	2	CH_3	H
Cl	Cl	H	2	CH_3	H
SH	CH_3	CH_3	2	CH_3	H
Cl	CH_3	CH_3	2	CH_3	H
SH	Cl	Cl	2	CH_3	H
Cl	Cl	Cl	2	CH_3	H
SH	H	H	1	CH_2CH_3	H
Cl	H	H	1	CH_2CH_3	H
SH	CH_3	H	1	CH_2CH_3	H
Cl	CH_3	H	1	CH_2CH_3	H
SH	Cl	H	1	CH_2CH_3	H
Cl	Cl	H	1	CH_2CH_3	H
SH	CH_3	CH_3	1	CH_2CH_3	H
Cl	CH_3	CH_3	1	CH_2CH_3	H
SH	Cl	Cl	1	CH_2CH_3	H
Cl	Cl	Cl	1	CH_2CH_3	H
SH	H	H	2	CH_2CH_3	H
Cl	H	H	2	CH_2CH_3	H
SH	CH_3	H	2	CH_2CH_3	H
Cl	CH_3	H	2	CH_2CH_3	H
SH	Cl	H	2	CH_2CH_3	H
Cl	Cl	H	2	CH_2CH_3	H
SH	CH_3	CH_3	2	CH_2CH_3	H
Cl	CH_3	CH_3	2	CH_2CH_3	H
SH	Cl	Cl	2	CH_2CH_3	H
Cl	Cl	Cl	2	CH_2CH_3	H
SH	H	H	1	$CH_2CH_2CH_3$	H
Cl	H	H	1	$CH_2CH_2CH_3$	H
SH	CH_3	H	1	$CH_2CH_2CH_3$	H
Cl	CH_3	H	1	$CH_2CH_2CH_3$	H
SH	Cl	H	1	$CH_2CH_2CH_3$	H
Cl	Cl	H	1	$CH_2CH_2CH_3$	H
SH	CH_3	CH_3	1	$CH_2CH_2CH_3$	H

Cl	CH_3	CH_3	1	$CH_2CH_2CH_3$	H
SH	Cl	Cl	1	$CH_2CH_2CH_3$	H
Cl	Cl	Cl	1	$CH_2CH_2CH_3$	H
SH	H	H	2	$CH_2CH_2CH_3$	H
Cl	H	H	2	$CH_2CH_2CH_3$	H
SH	CH_3	H	2	$CH_2CH_2CH_3$	H
Cl	CH_3	H	2	$CH_2CH_2CH_3$	H
SH	Cl	H	2	$CH_2CH_2CH_3$	H
Cl	Cl	H	2	$CH_2CH_2CH_3$	H
SH	CH_3	CH_3	2	$CH_2CH_2CH_3$	H
Cl	CH_3	CH_3	2	$CH_2CH_2CH_3$	H
SH	Cl	Cl	2	$CH_2CH_2CH_3$	H
Cl	Cl	Cl	2	$CH_2CH_2CH_3$	H
SH	H	H	1	H	CH_3
Cl	H	H	1	H	CH_3
SH	CH_3	H	1	H	CH_3
Cl	CH_3	H	1	H	CH_3
SH	Cl	H	1	H	CH_3
Cl	Cl	H	1	H	CH_3
SH	CH_3	CH_3	1	H	CH_3
Cl	CH_3	CH_3	1	H	CH_3
SH	Cl	Cl	1	H	CH_3
Cl	Cl	Cl	1	H	CH_3
SH	H	H	2	H	CH_3
Cl	H	H	2	H	CH_3
SH	CH_3	H	2	H	CH_3
Cl	CH_3	H	2	H	CH_3
SH	Cl	H	2	H	CH_3
Cl	Cl	H	2	H	CH_3
SH	CH_3	CH_3	2	H	CH_3
Cl	CH_3	CH_3	2	H	CH_3
SH	Cl	Cl	2	H	CH_3
Cl	Cl	Cl	2	H	CH_3
SH	H	H	1	CH_3	CH_3
Cl	H	H	1	CH_3	CH_3
SH	CH_3	H	1	CH_3	CH_3
Cl	CH_3	H	1	CH_3	CH_3
SH	Cl	H	1	CH_3	CH_3

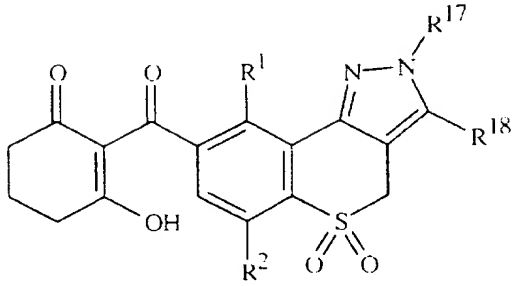
Cl	Cl	H	1	CH_3	CH_3
SH	CH_3	CH_3	1	CH_3	CH_3
Cl	CH_3	CH_3	1	CH_3	CH_3
SH	Cl	Cl	1	CH_3	CH_3
Cl	Cl	Cl	1	CH_3	CH_3
SH	H	H	2	CH_3	CH_3
Cl	H	H	2	CH_3	CH_3
SH	CH_3	H	2	CH_3	CH_3
Cl	CH_3	H	2	CH_3	CH_3
SH	Cl	H	2	CH_3	CH_3
Cl	Cl	H	2	CH_3	CH_3
SH	CH_3	CH_3	2	CH_3	CH_3
Cl	CH_3	CH_3	2	CH_3	CH_3
SH	Cl	Cl	2	CH_3	CH_3
Cl	Cl	Cl	2	CH_3	CH_3
SH	H	H	1	CH_2CH_3	CH_3
Cl	H	H	1	CH_2CH_3	CH_3
SH	CH_3	H	1	CH_2CH_3	CH_3
Cl	CH_3	H	1	CH_2CH_3	CH_3
SH	Cl	H	1	CH_2CH_3	CH_3
Cl	Cl	H	1	CH_2CH_3	CH_3
SH	CH_3	CH_3	1	CH_2CH_3	CH_3
Cl	CH_3	CH_3	1	CH_2CH_3	CH_3
SH	Cl	Cl	1	CH_2CH_3	CH_3
Cl	Cl	Cl	1	CH_2CH_3	CH_3
SH	H	H	2	CH_2CH_3	CH_3
Cl	H	H	2	CH_2CH_3	CH_3
SH	CH_3	H	2	CH_2CH_3	CH_3
Cl	CH_3	H	2	CH_2CH_3	CH_3
SH	Cl	H	2	CH_2CH_3	CH_3
Cl	Cl	H	2	CH_2CH_3	CH_3
SH	CH_3	CH_3	2	CH_2CH_3	CH_3
Cl	CH_3	CH_3	2	CH_2CH_3	CH_3
SH	Cl	Cl	2	CH_2CH_3	CH_3
Cl	Cl	Cl	2	CH_2CH_3	CH_3
SH	H	H	1	$CH_2CH_2CH_3$	CH_3
Cl	H	H	1	$CH_2CH_2CH_3$	CH_3
SH	CH_3	H	1	$CH_2CH_2CH_3$	CH_3

Cl	CH_3	H	1	$CH_2CH_2CH_3$	CH_3
SH	Cl	H	1	$CH_2CH_2CH_3$	CH_3
Cl	Cl	H	1	$CH_2CH_2CH_3$	CH_3
SH	CH_3	CH_3	1	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	CH_3	1	$CH_2CH_2CH_3$	CH_3
SH	Cl	Cl	1	$CH_2CH_2CH_3$	CH_3
Cl	Cl	Cl	1	$CH_2CH_2CH_3$	CH_3
SH	H	H	2	$CH_2CH_2CH_3$	CH_3
Cl	H	H	2	$CH_2CH_2CH_3$	CH_3
SH	CH_3	H	2	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	H	2	$CH_2CH_2CH_3$	CH_3
SH	Cl	H	2	$CH_2CH_2CH_3$	CH_3
Cl	Cl	H	2	$CH_2CH_2CH_3$	CH_3
SH	CH_3	CH_3	2	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	CH_3	2	$CH_2CH_2CH_3$	CH_3
SH	Cl	Cl	2	$CH_2CH_2CH_3$	CH_3
Cl	Cl	Cl	2	$CH_2CH_2CH_3$	CH_3
SH	H	H	1	H	Cl
Cl	H	H	1	H	Cl
SH	CH_3	H	1	H	Cl
Cl	CH_3	H	1	H	Cl
SH	Cl	H	1	H	Cl
Cl	Cl	H	1	H	Cl
SH	CH_3	CH_3	1	H	Cl
Cl	CH_3	CH_3	1	H	Cl
SH	Cl	Cl	1	H	Cl
Cl	Cl	Cl	1	H	Cl
SH	H	H	2	H	Cl
Cl	H	H	2	H	Cl
SH	CH_3	H	2	H	Cl
Cl	CH_3	H	2	H	Cl
SH	Cl	H	2	H	Cl
Cl	Cl	H	2	H	Cl
SH	CH_3	CH_3	2	H	Cl
Cl	CH_3	CH_3	2	H	Cl
SH	Cl	Cl	2	H	Cl
Cl	Cl	Cl	2	H	Cl
SH	H	H	1	CH_3	Cl

Cl	H	H	1	CH_3	Cl
SH	CH_3	H	1	CH_3	Cl
Cl	CH_3	H	1	CH_3	Cl
SH	Cl	H	1	CH_3	Cl
Cl	Cl	H	1	CH_3	Cl
SH	CH_3	CH_3	1	CH_3	Cl
Cl	CH_3	CH_3	1	CH_3	Cl
SH	Cl	Cl	1	CH_3	Cl
Cl	Cl	Cl	1	CH_3	Cl
SH	H	H	2	CH_3	Cl
Cl	H	H	2	CH_3	Cl
SH	CH_3	H	2	CH_3	Cl
Cl	CH_3	H	2	CH_3	Cl
SH	Cl	H	2	CH_3	Cl
Cl	Cl	H	2	CH_3	Cl
SH	CH_3	CH_3	2	CH_3	Cl
Cl	CH_3	CH_3	2	CH_3	Cl
SH	Cl	Cl	2	CH_3	Cl
Cl	Cl	Cl	2	CH_3	Cl
SH	H	H	1	CH_2CH_3	Cl
Cl	H	H	1	CH_2CH_3	Cl
SH	CH_3	H	1	CH_2CH_3	Cl
Cl	CH_3	H	1	CH_2CH_3	Cl
SH	Cl	H	1	CH_2CH_3	Cl
Cl	Cl	H	1	CH_2CH_3	Cl
SH	CH_3	CH_3	1	CH_2CH_3	Cl
Cl	CH_3	CH_3	1	CH_2CH_3	Cl
SH	Cl	Cl	1	CH_2CH_3	Cl
Cl	Cl	Cl	1	CH_2CH_3	Cl
SH	H	H	2	CH_2CH_3	Cl
Cl	H	H	2	CH_2CH_3	Cl
SH	CH_3	H	2	CH_2CH_3	Cl
Cl	CH_3	H	2	CH_2CH_3	Cl
SH	Cl	H	2	CH_2CH_3	Cl
Cl	Cl	H	2	CH_2CH_3	Cl
SH	CH_3	CH_3	2	CH_2CH_3	Cl
Cl	CH_3	CH_3	2	CH_2CH_3	Cl
SH	Cl	Cl	2	CH_2CH_3	Cl

Cl	Cl	Cl	2	CH_2CH_3	Cl
SH	H	H	1	$CH_2CH_2CH_3$	Cl
Cl	H	H	1	$CH_2CH_2CH_3$	Cl
SH	CH_3	H	1	$CH_2CH_2CH_3$	Cl
Cl	CH_3	H	1	$CH_2CH_2CH_3$	Cl
SH	Cl	H	1	$CH_2CH_2CH_3$	Cl
Cl	Cl	H	1	$CH_2CH_2CH_3$	Cl
SH	CH_3	CH_3	1	$CH_2CH_2CH_3$	Cl
Cl	CH_3	CH_3	1	$CH_2CH_2CH_3$	Cl
SH	Cl	Cl	1	$CH_2CH_2CH_3$	Cl
Cl	Cl	Cl	1	$CH_2CH_2CH_3$	Cl
SH	H	H	2	$CH_2CH_2CH_3$	Cl
Cl	H	H	2	$CH_2CH_2CH_3$	Cl
SH	CH_3	H	2	$CH_2CH_2CH_3$	Cl
Cl	CH_3	H	2	$CH_2CH_2CH_3$	Cl
SH	Cl	H	2	$CH_2CH_2CH_3$	Cl
Cl	Cl	H	2	$CH_2CH_2CH_3$	Cl
SH	CH_3	CH_3	2	$CH_2CH_2CH_3$	Cl
Cl	CH_3	CH_3	2	$CH_2CH_2CH_3$	Cl
SH	Cl	Cl	2	$CH_2CH_2CH_3$	Cl
Cl	Cl	Cl	2	$CH_2CH_2CH_3$	Cl

Table 7



R^1	R^2	R^{17}	R^{18}
H	H	$CH(CH_3)_2$	H
CH_3	H	$CH(CH_3)_2$	H
Cl	H	$CH(CH_3)_2$	H
CH_3	CH_3	$CH(CH_3)_2$	H
Cl	Cl	$CH(CH_3)_2$	H
H	H	phenyl	H
CH_3	H	phenyl	H

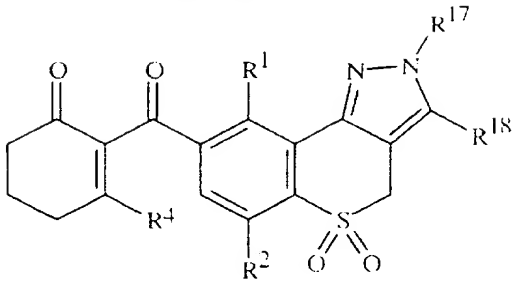
Cl	H	phenyl	H
CH_3	CH_3	phenyl	H
Cl	Cl	phenyl	H
H	H	(4-CH_3)Ph	H
CH_3	H	(4-CH_3)Ph	H
Cl	H	(4-CH_3)Ph	H
CH_3	CH_3	(4-CH_3)Ph	H
Cl	Cl	(4-CH_3)Ph	H
H	H	(4-Cl)Ph	H
CH_3	H	(4-Cl)Ph	H
Cl	H	(4-Cl)Ph	H
CH_3	CH_3	(4-Cl)Ph	H
Cl	Cl	(4-Cl)Ph	H
H	H	(4-NO_2)Ph	H
CH_3	H	(4-NO_2)Ph	H
Cl	H	(4-NO_2)Ph	H
CH_3	CH_3	(4-NO_2)Ph	H
Cl	Cl	(4-NO_2)Ph	H
H	H	(4-CN)Ph	H
CH_3	H	(4-CN)Ph	H
Cl	H	(4-CN)Ph	H
CH_3	CH_3	(4-CN)Ph	H
Cl	Cl	(4-CN)Ph	H
H	H	2-pyridyl	H
CH_3	H	2-pyridyl	H
Cl	H	2-pyridyl	H
CH_3	CH_3	2-pyridyl	H
Cl	Cl	2-pyridyl	H
H	H	4-pyridyl	H
CH_3	H	4-pyridyl	H
Cl	H	4-pyridyl	H
CH_3	CH_3	4-pyridyl	H
Cl	Cl	4-pyridyl	H
H	H	CH_2CF_3	H
CH_3	H	CH_2CF_3	H
Cl	H	CH_2CF_3	H
CH_3	CH_3	CH_2CF_3	H
Cl	Cl	CH_2CF_3	H

H	H	$CH(CH_3)_2$	Cl
CH_3	H	$CH(CH_3)_2$	Cl
Cl	H	$CH(CH_3)_2$	Cl
CH_3	CH_3	$CH(CH_3)_2$	Cl
Cl	Cl	$CH(CH_3)_2$	Cl
H	H	phenyl	Cl
CH_3	H	phenyl	Cl
Cl	H	phenyl	Cl
CH_3	CH_3	phenyl	Cl
Cl	Cl	phenyl	Cl
H	H	(4-CH_3)Ph	Cl
CH_3	H	(4-CH_3)Ph	Cl
Cl	H	(4-CH_3)Ph	Cl
CH_3	CH_3	(4-CH_3)Ph	Cl
Cl	Cl	(4-CH_3)Ph	Cl
H	H	(4-Cl)Ph	Cl
CH_3	H	(4-Cl)Ph	Cl
Cl	H	(4-Cl)Ph	Cl
CH_3	CH_3	(4-Cl)Ph	Cl
Cl	Cl	(4-Cl)Ph	Cl
H	H	(4-NO_2)Ph	Cl
CH_3	H	(4-NO_2)Ph	Cl
Cl	H	(4-NO_2)Ph	Cl
CH_3	CH_3	(4-NO_2)Ph	Cl
Cl	Cl	(4-NO_2)Ph	Cl
H	H	(4-CN)Ph	Cl
CH_3	H	(4-CN)Ph	Cl
Cl	H	(4-CN)Ph	Cl
CH_3	CH_3	(4-CN)Ph	Cl
Cl	Cl	(4-CN)Ph	Cl
H	H	2-pyridyl	Cl
CH_3	H	2-pyridyl	Cl
Cl	H	2-pyridyl	Cl
CH_3	CH_3	2-pyridyl	Cl
Cl	Cl	2-pyridyl	Cl
H	H	4-pyridyl	Cl
CH_3	H	4-pyridyl	Cl
Cl	H	4-pyridyl	Cl

CH_3	CH_3	4-pyridyl	Cl
Cl	Cl	4-pyridyl	Cl
H	H	CH_2CF_3	Cl
CH_3	H	CH_2CF_3	Cl
Cl	H	CH_2CF_3	Cl
CH_3	CH_3	CH_2CF_3	Cl
Cl	Cl	CH_2CF_3	Cl
H	H	$CH(CH_3)_2$	CH_3
CH_3	H	$CH(CH_3)_2$	CH_3
Cl	H	$CH(CH_3)_2$	CH_3
CH_3	CH_3	$CH(CH_3)_2$	CH_3
Cl	Cl	$CH(CH_3)_2$	CH_3
H	H	phenyl	CH_3
CH_3	H	phenyl	CH_3
Cl	H	phenyl	CH_3
CH_3	CH_3	phenyl	CH_3
Cl	Cl	phenyl	CH_3
H	H	(4-CH_3)Ph	CH_3
CH_3	H	(4-CH_3)Ph	CH_3
Cl	H	(4-CH_3)Ph	CH_3
CH_3	CH_3	(4-CH_3)Ph	CH_3
Cl	Cl	(4-CH_3)Ph	CH_3
H	H	(4-Cl)Ph	CH_3
CH_3	H	(4-Cl)Ph	CH_3
Cl	H	(4-Cl)Ph	CH_3
CH_3	CH_3	(4-Cl)Ph	CH_3
Cl	Cl	(4-Cl)Ph	CH_3
H	H	(4-NO_2)Ph	CH_3
CH_3	H	(4-NO_2)Ph	CH_3
Cl	H	(4-NO_2)Ph	CH_3
CH_3	CH_3	(4-NO_2)Ph	CH_3
Cl	Cl	(4-NO_2)Ph	CH_3
H	H	(4-CN)Ph	CH_3
CH_3	H	(4-CN)Ph	CH_3
Cl	H	(4-CN)Ph	CH_3
CH_3	CH_3	(4-CN)Ph	CH_3
Cl	Cl	(4-CN)Ph	CH_3
H	H	2-pyridyl	CH_3

CH_3	H	2-pyridyl	CH_3
Cl	H	2-pyridyl	CH_3
CH_3	CH_3	2-pyridyl	CH_3
Cl	Cl	2-pyridyl	CH_3
H	H	4-pyridyl	CH_3
CH_3	H	4-pyridyl	CH_3
Cl	H	4-pyridyl	CH_3
CH_3	CH_3	4-pyridyl	CH_3
Cl	Cl	4-pyridyl	CH_3
H	H	CH_2CF_3	CH_3
CH_3	H	CH_2CF_3	CH_3
Cl	H	CH_2CF_3	CH_3
CH_3	CH_3	CH_2CF_3	CH_3
Cl	Cl	CH_2CF_3	CH_3

Table 8



R^4	R^1	R^2	R^{17}	R^{18}
OH	CH_2CH_3	H	H	H
SH	CH_2CH_3	H	H	H
Cl	CH_2CH_3	H	H	H
OH	NO_2	H	H	H
SH	NO_2	H	H	H
Cl	NO_2	H	H	H
OH	OCH_3	H	H	H
SH	OCH_3	H	H	H
Cl	OCH_3	H	H	H
OH	CH_2CH_3	CH_3	H	H
SH	CH_2CH_3	CH_3	H	H
Cl	CH_2CH_3	CH_3	H	H
OH	NO_2	CH_3	H	H
SH	NO_2	CH_3	H	H

Cl	NO_2	CH_3	H	H
OH	OCH_3	CH_3	H	H
SH	OCH_3	CH_3	H	H
Cl	OCH_3	CH_3	H	H
OH	CH_2CH_3	Cl	H	H
SH	CH_2CH_3	Cl	H	H
Cl	CH_2CH_3	Cl	H	H
OH	NO_2	Cl	H	H
SH	NO_2	Cl	H	H
Cl	NO_2	Cl	H	H
OH	OCH_3	Cl	H	H
SH	OCH_3	Cl	H	H
Cl	OCH_3	Cl	H	H
OH	CH_2CH_3	H	CH_3	H
SH	CH_2CH_3	H	CH_3	H
Cl	CH_2CH_3	H	CH_3	H
OH	NO_2	H	CH_3	H
SH	NO_2	H	CH_3	H
Cl	NO_2	H	CH_3	H
OH	OCH_3	H	CH_3	H
SH	OCH_3	H	CH_3	H
Cl	OCH_3	H	CH_3	H
OH	CH_2CH_3	CH_3	CH_3	H
SH	CH_2CH_3	CH_3	CH_3	H
Cl	CH_2CH_3	CH_3	CH_3	H
OH	NO_2	CH_3	CH_3	H
SH	NO_2	CH_3	CH_3	H
Cl	NO_2	CH_3	CH_3	H
OH	OCH_3	CH_3	CH_3	H
SH	OCH_3	CH_3	CH_3	H
Cl	OCH_3	CH_3	CH_3	H
OH	CH_2CH_3	Cl	CH_3	H
SH	CH_2CH_3	Cl	CH_3	H
Cl	CH_2CH_3	Cl	CH_3	H
OH	NO_2	Cl	CH_3	H
SH	NO_2	Cl	CH_3	H
Cl	NO_2	Cl	CH_3	H
OH	OCH_3	Cl	CH_3	H

SH	OCH_3	Cl	CH_3	H
Cl	OCH_3	Cl	CH_3	H
OH	CH_2CH_3	H	CH_2CH_3	H
SH	CH_2CH_3	H	CH_2CH_3	H
Cl	CH_2CH_3	H	CH_2CH_3	H
OH	NO_2	H	CH_2CH_3	H
SH	NO_2	H	CH_2CH_3	H
Cl	NO_2	H	CH_2CH_3	H
OH	OCH_3	H	CH_2CH_3	H
SH	OCH_3	H	CH_2CH_3	H
Cl	OCH_3	H	CH_2CH_3	H
OH	CH_2CH_3	CH_3	CH_2CH_3	H
SH	CH_2CH_3	CH_3	CH_2CH_3	H
Cl	CH_2CH_3	CH_3	CH_2CH_3	H
OH	NO_2	CH_3	CH_2CH_3	H
SH	NO_2	CH_3	CH_2CH_3	H
Cl	NO_2	CH_3	CH_2CH_3	H
OH	OCH_3	CH_3	CH_2CH_3	H
SH	OCH_3	CH_3	CH_2CH_3	H
Cl	OCH_3	CH_3	CH_2CH_3	H
OH	CH_2CH_3	Cl	CH_2CH_3	H
SH	CH_2CH_3	Cl	CH_2CH_3	H
Cl	CH_2CH_3	Cl	CH_2CH_3	H
OH	NO_2	Cl	CH_2CH_3	H
SH	NO_2	Cl	CH_2CH_3	H
Cl	NO_2	Cl	CH_2CH_3	H
OH	OCH_3	Cl	CH_2CH_3	H
SH	OCH_3	Cl	CH_2CH_3	H
Cl	OCH_3	Cl	CH_2CH_3	H
OH	CH_2CH_3	H	$CH_2CH_2CH_3$	H
SH	CH_2CH_3	H	$CH_2CH_2CH_3$	H
Cl	CH_2CH_3	H	$CH_2CH_2CH_3$	H
OH	NO_2	H	$CH_2CH_2CH_3$	H
SH	NO_2	H	$CH_2CH_2CH_3$	H
Cl	NO_2	H	$CH_2CH_2CH_3$	H
OH	OCH_3	H	$CH_2CH_2CH_3$	H
SH	OCH_3	H	$CH_2CH_2CH_3$	H
Cl	OCH_3	H	$CH_2CH_2CH_3$	H

OH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	H
SH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	H
Cl	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	H
OH	NO_2	CH_3	$CH_2CH_2CH_3$	H
SH	NO_2	CH_3	$CH_2CH_2CH_3$	H
Cl	NO_2	CH_3	$CH_2CH_2CH_3$	H
OH	OCH_3	CH_3	$CH_2CH_2CH_3$	H
SH	OCH_3	CH_3	$CH_2CH_2CH_3$	H
Cl	OCH_3	CH_3	$CH_2CH_2CH_3$	H
OH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	H
SH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	H
Cl	CH_2CH_3	Cl	$CH_2CH_2CH_3$	H
OH	NO_2	Cl	$CH_2CH_2CH_3$	H
SH	NO_2	Cl	$CH_2CH_2CH_3$	H
Cl	NO_2	Cl	$CH_2CH_2CH_3$	H
OH	OCH_3	Cl	$CH_2CH_2CH_3$	H
SH	OCH_3	Cl	$CH_2CH_2CH_3$	H
Cl	OCH_3	Cl	$CH_2CH_2CH_3$	H
OH	CH_2CH_3	H	H	CH_3
SH	CH_2CH_3	H	H	CH_3
Cl	CH_2CH_3	H	H	CH_3
OH	NO_2	H	H	CH_3
SH	NO_2	H	H	CH_3
Cl	NO_2	H	H	CH_3
OH	OCH_3	H	H	CH_3
SH	OCH_3	H	H	CH_3
Cl	OCH_3	H	H	CH_3
OH	CH_2CH_3	CH_3	H	CH_3
SH	CH_2CH_3	CH_3	H	CH_3
Cl	CH_2CH_3	CH_3	H	CH_3
OH	NO_2	CH_3	H	CH_3
SH	NO_2	CH_3	H	CH_3
Cl	NO_2	CH_3	H	CH_3
OH	OCH_3	CH_3	H	CH_3
SH	OCH_3	CH_3	H	CH_3
Cl	OCH_3	CH_3	H	CH_3
OH	CH_2CH_3	Cl	H	CH_3
SH	CH_2CH_3	Cl	H	CH_3

Cl	CH_2CH_3	Cl	H	CH_3
OH	NO_2	Cl	H	CH_3
SH	NO_2	Cl	H	CH_3
Cl	NO_2	Cl	H	CH_3
OH	OCH_3	Cl	H	CH_3
SH	OCH_3	Cl	H	CH_3
Cl	OCH_3	Cl	H	CH_3
OH	CH_2CH_3	H	CH_3	CH_3
SH	CH_2CH_3	H	CH_3	CH_3
Cl	CH_2CH_3	H	CH_3	CH_3
OH	NO_2	H	CH_3	CH_3
SH	NO_2	H	CH_3	CH_3
Cl	NO_2	H	CH_3	CH_3
OH	OCH_3	H	CH_3	CH_3
SH	OCH_3	H	CH_3	CH_3
Cl	OCH_3	H	CH_3	CH_3
OH	CH_2CH_3	CH_3	CH_3	CH_3
SH	CH_2CH_3	CH_3	CH_3	CH_3
Cl	CH_2CH_3	CH_3	CH_3	CH_3
OH	NO_2	CH_3	CH_3	CH_3
SH	NO_2	CH_3	CH_3	CH_3
Cl	NO_2	CH_3	CH_3	CH_3
OH	OCH_3	CH_3	CH_3	CH_3
SH	OCH_3	CH_3	CH_3	CH_3
Cl	OCH_3	CH_3	CH_3	CH_3
OH	CH_2CH_3	Cl	CH_3	CH_3
SH	CH_2CH_3	Cl	CH_3	CH_3
Cl	CH_2CH_3	Cl	CH_3	CH_3
OH	NO_2	Cl	CH_3	CH_3
SH	NO_2	Cl	CH_3	CH_3
Cl	NO_2	Cl	CH_3	CH_3
OH	OCH_3	Cl	CH_3	CH_3
SH	OCH_3	Cl	CH_3	CH_3
Cl	OCH_3	Cl	CH_3	CH_3
OH	CH_2CH_3	H	CH_2CH_3	CH_3
SH	CH_2CH_3	H	CH_2CH_3	CH_3
Cl	CH_2CH_3	H	CH_2CH_3	CH_3
OH	NO_2	H	CH_2CH_3	CH_3

SH	NO_2	H	CH_2CH_3	CH_3
Cl	NO_2	H	CH_2CH_3	CH_3
OH	OCH_3	H	CH_2CH_3	CH_3
SH	OCH_3	H	CH_2CH_3	CH_3
Cl	OCH_3	H	CH_2CH_3	CH_3
OH	CH_2CH_3	CH_3	CH_2CH_3	CH_3
SH	CH_2CH_3	CH_3	CH_2CH_3	CH_3
Cl	CH_2CH_3	CH_3	CH_2CH_3	CH_3
OH	NO_2	CH_3	CH_2CH_3	CH_3
SH	NO_2	CH_3	CH_2CH_3	CH_3
Cl	NO_2	CH_3	CH_2CH_3	CH_3
OH	OCH_3	CH_3	CH_2CH_3	CH_3
SH	OCH_3	CH_3	CH_2CH_3	CH_3
Cl	OCH_3	CH_3	CH_2CH_3	CH_3
OH	CH_2CH_3	Cl	CH_2CH_3	CH_3
SH	CH_2CH_3	Cl	CH_2CH_3	CH_3
Cl	CH_2CH_3	Cl	CH_2CH_3	CH_3
OH	NO_2	Cl	CH_2CH_3	CH_3
SH	NO_2	Cl	CH_2CH_3	CH_3
Cl	NO_2	Cl	CH_2CH_3	CH_3
OH	OCH_3	Cl	CH_2CH_3	CH_3
SH	OCH_3	Cl	CH_2CH_3	CH_3
Cl	OCH_3	Cl	CH_2CH_3	CH_3
OH	CH_2CH_3	H	$CH_2CH_2CH_3$	CH_3
SH	CH_2CH_3	H	$CH_2CH_2CH_3$	CH_3
Cl	CH_2CH_3	H	$CH_2CH_2CH_3$	CH_3
OH	NO_2	H	$CH_2CH_2CH_3$	CH_3
SH	NO_2	H	$CH_2CH_2CH_3$	CH_3
Cl	NO_2	H	$CH_2CH_2CH_3$	CH_3
OH	OCH_3	H	$CH_2CH_2CH_3$	CH_3
SH	OCH_3	H	$CH_2CH_2CH_3$	CH_3
Cl	OCH_3	H	$CH_2CH_2CH_3$	CH_3
OH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	CH_3
SH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	CH_3
Cl	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	CH_3
OH	NO_2	CH_3	$CH_2CH_2CH_3$	CH_3
SH	NO_2	CH_3	$CH_2CH_2CH_3$	CH_3
Cl	NO_2	CH_3	$CH_2CH_2CH_3$	CH_3

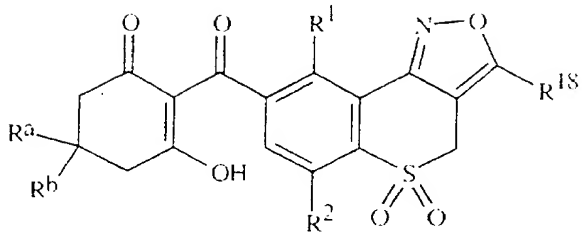
OH	OCH_3	CH_3	$CH_2CH_2CH_3$	CH_3
SH	OCH_3	CH_3	$CH_2CH_2CH_3$	CH_3
Cl	OCH_3	CH_3	$CH_2CH_2CH_3$	CH_3
OH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	CH_3
SH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	CH_3
Cl	CH_2CH_3	Cl	$CH_2CH_2CH_3$	CH_3
OH	NO_2	Cl	$CH_2CH_2CH_3$	CH_3
SH	NO_2	Cl	$CH_2CH_2CH_3$	CH_3
Cl	NO_2	Cl	$CH_2CH_2CH_3$	CH_3
OH	OCH_3	Cl	$CH_2CH_2CH_3$	CH_3
SH	OCH_3	Cl	$CH_2CH_2CH_3$	CH_3
Cl	OCH_3	Cl	$CH_2CH_2CH_3$	CH_3
OH	CH_2CH_3	H	H	Cl
SH	CH_2CH_3	H	H	Cl
Cl	CH_2CH_3	H	H	Cl
OH	NO_2	H	H	Cl
SH	NO_2	H	H	Cl
Cl	NO_2	H	H	Cl
OH	OCH_3	H	H	Cl
SH	OCH_3	H	H	Cl
Cl	OCH_3	H	H	Cl
OH	CH_2CH_3	CH_3	H	Cl
SH	CH_2CH_3	CH_3	H	Cl
Cl	CH_2CH_3	CH_3	H	Cl
OH	NO_2	CH_3	H	Cl
SH	NO_2	CH_3	H	Cl
Cl	NO_2	CH_3	H	Cl
OH	OCH_3	CH_3	H	Cl
SH	OCH_3	CH_3	H	Cl
Cl	OCH_3	CH_3	H	Cl
OH	CH_2CH_3	Cl	H	Cl
SH	CH_2CH_3	Cl	H	Cl
Cl	CH_2CH_3	Cl	H	Cl
OH	NO_2	Cl	H	Cl
SH	NO_2	Cl	H	Cl
Cl	NO_2	Cl	H	Cl
OH	OCH_3	Cl	H	Cl
SH	OCH_3	Cl	H	Cl

Cl	OCH_3	Cl	H	Cl
OH	CH_2CH_3	H	CH_3	Cl
SH	CH_2CH_3	H	CH_3	Cl
Cl	CH_2CH_3	H	CH_3	Cl
OH	NO_2	H	CH_3	Cl
SH	NO_2	H	CH_3	Cl
Cl	NO_2	H	CH_3	Cl
OH	OCH_3	H	CH_3	Cl
SH	OCH_3	H	CH_3	Cl
Cl	OCH_3	H	CH_3	Cl
OH	CH_2CH_3	CH_3	CH_3	Cl
SH	CH_2CH_3	CH_3	CH_3	Cl
Cl	CH_2CH_3	CH_3	CH_3	Cl
OH	NO_2	CH_3	CH_3	Cl
SH	NO_2	CH_3	CH_3	Cl
Cl	NO_2	CH_3	CH_3	Cl
OH	OCH_3	CH_3	CH_3	Cl
SH	OCH_3	CH_3	CH_3	Cl
Cl	OCH_3	CH_3	CH_3	Cl
OH	CH_2CH_3	Cl	CH_3	Cl
SH	CH_2CH_3	Cl	CH_3	Cl
Cl	CH_2CH_3	Cl	CH_3	Cl
OH	NO_2	Cl	CH_3	Cl
SH	NO_2	Cl	CH_3	Cl
Cl	NO_2	Cl	CH_3	Cl
OH	OCH_3	Cl	CH_3	Cl
SH	OCH_3	Cl	CH_3	Cl
Cl	OCH_3	Cl	CH_3	Cl
OH	CH_2CH_3	H	CH_2CH_3	Cl
SH	CH_2CH_3	H	CH_2CH_3	Cl
Cl	CH_2CH_3	H	CH_2CH_3	Cl
OH	NO_2	H	CH_2CH_3	Cl
SH	NO_2	H	CH_2CH_3	Cl
Cl	NO_2	H	CH_2CH_3	Cl
OH	OCH_3	H	CH_2CH_3	Cl
SH	OCH_3	H	CH_2CH_3	Cl
Cl	OCH_3	H	CH_2CH_3	Cl
OH	CH_2CH_3	CH_3	CH_2CH_3	Cl

SH	CH_2CH_3	CH_3	CH_2CH_3	Cl
Cl	CH_2CH_3	CH_3	CH_2CH_3	Cl
OH	NO_2	CH_3	CH_2CH_3	Cl
SH	NO_2	CH_3	CH_2CH_3	Cl
Cl	NO_2	CH_3	CH_2CH_3	Cl
OH	OCH_3	CH_3	CH_2CH_3	Cl
SH	OCH_3	CH_3	CH_2CH_3	Cl
Cl	OCH_3	CH_3	CH_2CH_3	Cl
OH	CH_2CH_3	Cl	CH_2CH_3	Cl
SH	CH_2CH_3	Cl	CH_2CH_3	Cl
Cl	CH_2CH_3	Cl	CH_2CH_3	Cl
OH	NO_2	Cl	CH_2CH_3	Cl
SH	NO_2	Cl	CH_2CH_3	Cl
Cl	NO_2	Cl	CH_2CH_3	Cl
OH	OCH_3	Cl	CH_2CH_3	Cl
SH	OCH_3	Cl	CH_2CH_3	Cl
Cl	OCH_3	Cl	CH_2CH_3	Cl
OH	CH_2CH_3	H	$CH_2CH_2CH_3$	Cl
SH	CH_2CH_3	H	$CH_2CH_2CH_3$	Cl
Cl	CH_2CH_3	H	$CH_2CH_2CH_3$	Cl
OH	NO_2	H	$CH_2CH_2CH_3$	Cl
SH	NO_2	H	$CH_2CH_2CH_3$	Cl
Cl	NO_2	H	$CH_2CH_2CH_3$	Cl
OH	OCH_3	H	$CH_2CH_2CH_3$	Cl
SH	OCH_3	H	$CH_2CH_2CH_3$	Cl
Cl	OCH_3	H	$CH_2CH_2CH_3$	Cl
OH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	Cl
SH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	Cl
Cl	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	Cl
OH	NO_2	CH_3	$CH_2CH_2CH_3$	Cl
SH	NO_2	CH_3	$CH_2CH_2CH_3$	Cl
Cl	NO_2	CH_3	$CH_2CH_2CH_3$	Cl
OH	OCH_3	CH_3	$CH_2CH_2CH_3$	Cl
SH	OCH_3	CH_3	$CH_2CH_2CH_3$	Cl
Cl	OCH_3	CH_3	$CH_2CH_2CH_3$	Cl
OH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	Cl
SH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	Cl
Cl	CH_2CH_3	Cl	$CH_2CH_2CH_3$	Cl

OH	NO_2	Cl	$CH_2CH_2CH_3$	Cl
SH	NO_2	Cl	$CH_2CH_2CH_3$	Cl
Cl	NO_2	Cl	$CH_2CH_2CH_3$	Cl
OH	OCH_3	Cl	$CH_2CH_2CH_3$	Cl
SH	OCH_3	Cl	$CH_2CH_2CH_3$	Cl
Cl	OCH_3	Cl	$CH_2CH_2CH_3$	Cl

Table 9

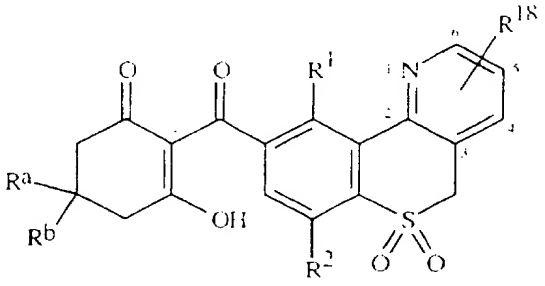


R^a	R^b	R^1	R^2	R^{18}
H	H	H	H	H
CH_3	H	H	H	H
CH_3	CH_3	H	H	H
H	H	CH_3	H	H
CH_3	H	CH_3	H	H
CH_3	CH_3	CH_3	H	H
H	H	Cl	H	H
CH_3	H	Cl	H	H
CH_3	CH_3	Cl	H	H
H	H	H	CH_3	H
CH_3	H	H	CH_3	H
CH_3	CH_3	H	CH_3	H
H	H	CH_3	CH_3	H
CH_3	H	CH_3	CH_3	H
CH_3	CH_3	CH_3	CH_3	H
H	H	Cl	CH_3	H
CH_3	H	Cl	CH_3	H
CH_3	CH_3	Cl	CH_3	H
H	H	H	Cl	H
CH_3	H	H	Cl	H
CH_3	CH_3	H	Cl	H

H	H	CH_3	Cl	H
CH_3	H	CH_3	Cl	H
CH_3	CH_3	CH_3	Cl	H
H	H	Cl	Cl	H
CH_3	H	Cl	Cl	H
CH_3	CH_3	Cl	Cl	H
H	H	H	H	CH_3
CH_3	H	H	H	CH_3
CH_3	CH_3	H	H	CH_3
H	H	CH_3	H	CH_3
CH_3	H	CH_3	H	CH_3
CH_3	CH_3	CH_3	H	CH_3
H	H	Cl	H	CH_3
CH_3	H	Cl	H	CH_3
CH_3	CH_3	Cl	H	CH_3
H	H	H	CH_3	CH_3
CH_3	H	H	CH_3	CH_3
CH_3	CH_3	H	CH_3	CH_3
H	H	CH_3	CH_3	CH_3
CH_3	H	CH_3	CH_3	CH_3
CH_3	CH_3	CH_3	CH_3	CH_3
H	H	Cl	CH_3	CH_3
CH_3	H	Cl	CH_3	CH_3
CH_3	CH_3	Cl	CH_3	CH_3
H	H	H	Cl	CH_3
CH_3	H	H	Cl	CH_3
CH_3	CH_3	H	Cl	CH_3
H	H	CH_3	Cl	CH_3
CH_3	H	CH_3	Cl	CH_3
CH_3	CH_3	CH_3	Cl	CH_3
H	H	Cl	Cl	CH_3
CH_3	H	Cl	Cl	CH_3
CH_3	CH_3	Cl	Cl	CH_3
H	H	H	H	Cl
CH_3	H	H	H	Cl
CH_3	CH_3	H	H	Cl
H	H	CH_3	H	Cl
CH_3	H	CH_3	H	Cl

CH_3	CH_3	CH_3	H	Cl
H	H	Cl	H	Cl
CH_3	H	Cl	H	Cl
CH_3	CH_3	Cl	H	Cl
H	H	H	CH_3	Cl
CH_3	H	H	CH_3	Cl
CH_3	CH_3	H	CH_3	Cl
H	H	CH_3	CH_3	Cl
CH_3	H	CH_3	CH_3	Cl
CH_3	CH_3	CH_3	CH_3	Cl
H	H	Cl	CH_3	Cl
CH_3	H	Cl	CH_3	Cl
CH_3	CH_3	Cl	CH_3	Cl
H	H	H	Cl	Cl
CH_3	H	H	Cl	Cl
CH_3	CH_3	H	Cl	Cl
H	H	CH_3	Cl	Cl
CH_3	H	CH_3	Cl	Cl
CH_3	CH_3	CH_3	Cl	Cl
H	H	Cl	Cl	Cl
CH_3	H	Cl	Cl	Cl
CH_3	CH_3	Cl	Cl	Cl

Table 10



R^a	R^b	R^1	R^2	R^{18}
H	H	H	H	H
CH_3	H	H	H	H
CH_3	CH_3	H	H	H
H	H	CH_3	H	H
CH_3	H	CH_3	H	H
CH_3	CH_3	CH_3	H	H

H	H	Cl	H	H
CH_3	H	Cl	H	H
CH_3	CH_3	Cl	H	H
H	H	H	CH_3	H
CH_3	H	H	CH_3	H
CH_3	CH_3	H	CH_3	H
H	H	CH_3	CH_3	H
CH_3	H	CH_3	CH_3	H
CH_3	CH_3	CH_3	CH_3	H
H	H	Cl	CH_3	H
CH_3	H	Cl	CH_3	H
CH_3	CH_3	Cl	CH_3	H
H	H	H	Cl	H
CH_3	H	H	Cl	H
CH_3	CH_3	H	Cl	H
H	H	CH_3	Cl	H
CH_3	H	CH_3	Cl	H
CH_3	CH_3	CH_3	Cl	H
H	H	Cl	Cl	H
CH_3	H	Cl	Cl	H
CH_3	CH_3	Cl	Cl	H
H	H	H	H	6-CH_3
CH_3	H	H	H	6-CH_3
CH_3	CH_3	H	H	6-CH_3
H	H	CH_3	H	6-CH_3
CH_3	H	CH_3	H	6-CH_3
CH_3	CH_3	CH_3	H	6-CH_3
H	H	Cl	H	6-CH_3
CH_3	H	Cl	H	6-CH_3
CH_3	CH_3	Cl	H	6-CH_3
H	H	H	CH_3	6-CH_3
CH_3	H	H	CH_3	6-CH_3
CH_3	CH_3	H	CH_3	6-CH_3
H	H	CH_3	CH_3	6-CH_3
CH_3	H	CH_3	CH_3	6-CH_3
CH_3	CH_3	CH_3	CH_3	6-CH_3
H	H	Cl	CH_3	6-CH_3
CH_3	H	Cl	CH_3	6-CH_3

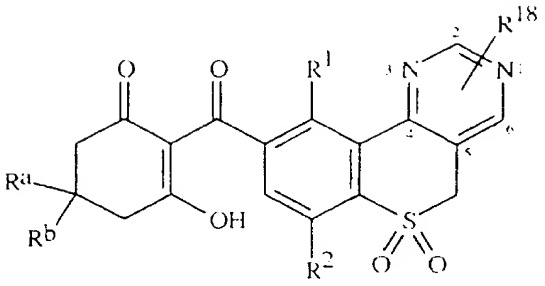
CH_3	CH_3	Cl	CH_3	6-CH_3
H	H	H	Cl	6-CH_3
CH_3	H	H	Cl	6-CH_3
CH_3	CH_3	H	Cl	6-CH_3
H	H	CH_3	Cl	6-CH_3
CH_3	H	CH_3	Cl	6-CH_3
CH_3	CH_3	CH_3	Cl	6-CH_3
H	H	Cl	Cl	6-CH_3
CH_3	H	Cl	Cl	6-CH_3
CH_3	CH_3	Cl	Cl	6-CH_3
H	H	H	H	5-CH_3
CH_3	H	H	H	5-CH_3
CH_3	CH_3	H	H	5-CH_3
H	H	CH_3	H	5-CH_3
CH_3	H	CH_3	H	5-CH_3
CH_3	CH_3	CH_3	H	5-CH_3
H	H	Cl	H	5-CH_3
CH_3	H	Cl	H	5-CH_3
CH_3	CH_3	Cl	H	5-CH_3
H	H	H	CH_3	5-CH_3
CH_3	H	H	CH_3	5-CH_3
CH_3	CH_3	H	CH_3	5-CH_3
H	H	CH_3	CH_3	5-CH_3
CH_3	H	CH_3	CH_3	5-CH_3
CH_3	CH_3	CH_3	CH_3	5-CH_3
H	H	Cl	CH_3	5-CH_3
CH_3	H	Cl	CH_3	5-CH_3
CH_3	CH_3	Cl	CH_3	5-CH_3
H	H	H	Cl	5-CH_3
CH_3	H	H	Cl	5-CH_3
CH_3	CH_3	H	Cl	5-CH_3
H	H	CH_3	Cl	5-CH_3
CH_3	H	CH_3	Cl	5-CH_3
CH_3	CH_3	CH_3	Cl	5-CH_3
H	H	Cl	Cl	5-CH_3
CH_3	H	Cl	Cl	5-CH_3
CH_3	CH_3	Cl	Cl	5-CH_3
H	H	H	H	4-CH_3

CH_3	H	H	H	4-CH_3
CH_3	CH_3	H	H	4-CH_3
H	H	CH_3	H	4-CH_3
CH_3	H	CH_3	H	4-CH_3
CH_3	CH_3	CH_3	H	4-CH_3
H	H	Cl	H	4-CH_3
CH_3	H	Cl	H	4-CH_3
CH_3	CH_3	Cl	H	4-CH_3
H	H	H	CH_3	4-CH_3
CH_3	H	H	CH_3	4-CH_3
CH_3	CH_3	H	CH_3	4-CH_3
H	H	CH_3	CH_3	4-CH_3
CH_3	H	CH_3	CH_3	4-CH_3
CH_3	CH_3	CH_3	CH_3	4-CH_3
H	H	Cl	CH_3	4-CH_3
CH_3	H	Cl	CH_3	4-CH_3
CH_3	CH_3	Cl	CH_3	4-CH_3
H	H	H	Cl	4-CH_3
CH_3	H	H	Cl	4-CH_3
CH_3	CH_3	H	Cl	4-CH_3
H	H	CH_3	Cl	4-CH_3
CH_3	H	CH_3	Cl	4-CH_3
CH_3	CH_3	CH_3	Cl	4-CH_3
H	H	Cl	Cl	4-CH_3
CH_3	H	Cl	Cl	4-CH_3
CH_3	CH_3	Cl	Cl	4-CH_3
H	H	H	H	6-Cl
CH_3	H	H	H	6-Cl
CH_3	CH_3	H	H	6-Cl
H	H	CH_3	H	6-Cl
CH_3	H	CH_3	H	6-Cl
CH_3	CH_3	CH_3	H	6-Cl
H	H	Cl	H	6-Cl
CH_3	H	Cl	H	6-Cl
CH_3	CH_3	Cl	H	6-Cl
H	H	H	CH_3	6-Cl
CH_3	H	H	CH_3	6-Cl
CH_3	CH_3	H	CH_3	6-Cl

H	H	CH_3	CH_3	6-Cl
CH_3	H	CH_3	CH_3	6-Cl
CH_3	CH_3	CH_3	CH_3	6-Cl
H	H	Cl	CH_3	6-Cl
CH_3	H	Cl	CH_3	6-Cl
CH_3	CH_3	Cl	CH_3	6-Cl
H	H	H	Cl	6-Cl
CH_3	H	H	Cl	6-Cl
CH_3	CH_3	H	Cl	6-Cl
H	H	CH_3	Cl	6-Cl
CH_3	H	CH_3	Cl	6-Cl
CH_3	CH_3	CH_3	Cl	6-Cl
H	H	Cl	Cl	6-Cl
CH_3	H	Cl	Cl	6-Cl
CH_3	CH_3	Cl	Cl	6-Cl
H	H	H	H	4-Cl
CH_3	H	H	H	4-Cl
CH_3	CH_3	H	H	4-Cl
H	H	CH_3	H	4-Cl
CH_3	H	CH_3	H	4-Cl
CH_3	CH_3	CH_3	H	4-Cl
H	H	Cl	H	4-Cl
CH_3	H	Cl	H	4-Cl
CH_3	CH_3	Cl	H	4-Cl
H	H	H	CH_3	4-Cl
CH_3	H	H	CH_3	4-Cl
CH_3	CH_3	H	CH_3	4-Cl
H	H	CH_3	CH_3	4-Cl
CH_3	H	CH_3	CH_3	4-Cl
CH_3	CH_3	CH_3	CH_3	4-Cl
H	H	Cl	CH_3	4-Cl
CH_3	H	Cl	CH_3	4-Cl
CH_3	CH_3	Cl	CH_3	4-Cl
H	H	H	Cl	4-Cl
CH_3	H	H	Cl	4-Cl
CH_3	CH_3	H	Cl	4-Cl
H	H	CH_3	Cl	4-Cl
CH_3	H	CH_3	Cl	4-Cl

CH_3	CH_3	CH_3	Cl	4-Cl
H	H	Cl	Cl	4-Cl
CH_3	H	Cl	Cl	4-Cl
CH_3	CH_3	Cl	Cl	4-Cl

Table 11



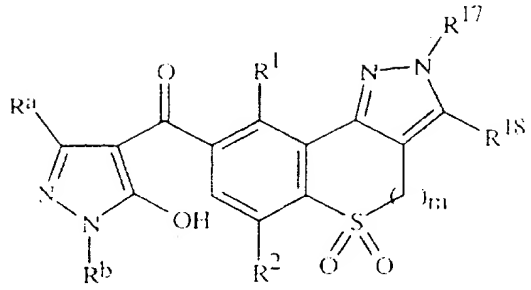
R^a	R^b	R^1	R^2	R^{18}
H	H	H	H	H
CH_3	H	H	H	H
CH_3	CH_3	H	H	H
H	H	CH_3	H	H
CH_3	H	CH_3	H	H
CH_3	CH_3	CH_3	H	H
H	H	Cl	H	H
CH_3	H	Cl	H	H
CH_3	CH_3	Cl	H	H
H	H	H	CH_3	H
CH_3	H	H	CH_3	H
CH_3	CH_3	H	CH_3	H
H	H	CH_3	CH_3	H
CH_3	H	CH_3	CH_3	H
CH_3	CH_3	CH_3	CH_3	H
H	H	Cl	CH_3	H
CH_3	H	Cl	CH_3	H
CH_3	CH_3	Cl	CH_3	H
H	H	H	Cl	H
CH_3	H	H	Cl	H
CH_3	CH_3	H	Cl	H
H	H	CH_3	Cl	H
CH_3	H	CH_3	Cl	H
CH_3	CH_3	CH_3	Cl	H

H	H	Cl	Cl	H
CH_3	H	Cl	Cl	H
CH_3	CH_3	Cl	Cl	H
H	H	H	H	2-CH_3
CH_3	H	H	H	2-CH_3
CH_3	CH_3	H	H	2-CH_3
H	H	CH_3	H	2-CH_3
CH_3	H	CH_3	H	2-CH_3
CH_3	CH_3	CH_3	H	2 CH_3
H	H	Cl	H	2-CH_3
CH_3	H	Cl	H	2-CH_3
CH_3	CH_3	Cl	H	2-CH_3
H	H	H	CH_3	2-CH_3
CH_3	H	H	CH_3	2-CH_3
CH_3	CH_3	H	CH_3	2-CH_3
H	H	CH_3	CH_3	2-CH_3
CH_3	H	CH_3	CH_3	2-CH_3
CH_3	CH_3	CH_3	CH_3	2-CH_3
H	H	Cl	CH_3	2-CH_3
CH_3	H	Cl	CH_3	2-CH_3
CH_3	CH_3	Cl	CH_3	2-CH_3
H	H	H	Cl	2-CH_3
CH_3	H	H	Cl	2-CH_3
CH_3	CH_3	H	Cl	2 CH_3
H	H	CH_3	Cl	2-CH_3
CH_3	H	CH_3	Cl	2-CH_3
CH_3	CH_3	CH_3	Cl	2-CH_3
H	H	Cl	Cl	2-CH_3
CH_3	H	Cl	Cl	2-CH_3
CH_3	CH_3	Cl	Cl	2-CH_3
H	H	H	H	6-CH_3
CH_3	H	H	H	6-CH_3
CH_3	CH_3	H	H	6-CH_3
H	H	CH_3	H	6-CH_3
CH_3	H	CH_3	H	6-CH_3
CH_3	CH_3	CH_3	H	6-CH_3
H	H	Cl	H	6-CH_3
CH_3	H	Cl	H	6-CH_3

CH_3	CH_3	Cl	H	6-CH_3
H	H	H	CH_3	6-CH_3
CH_3	H	H	CH_3	6-CH_3
CH_3	CH_3	H	CH_3	6-CH_3
H	H	CH_3	CH_3	6-CH_3
CH_3	H	CH_3	CH_3	6-CH_3
CH_3	CH_3	CH_3	CH_3	6-CH_3
H	H	Cl	CH_3	6-CH_3
CH_3	H	Cl	CH_3	6-CH_3
CH_3	CH_3	Cl	CH_3	6-CH_3
H	H	H	Cl	6-CH_3
CH_3	H	H	Cl	6-CH_3
CH_3	CH_3	H	Cl	6-CH_3
H	H	CH_3	Cl	6-CH_3
CH_3	H	CH_3	Cl	6-CH_3
CH_3	CH_3	CH_3	Cl	6-CH_3
H	H	Cl	Cl	6-CH_3
CH_3	H	Cl	Cl	6-CH_3
CH_3	CH_3	Cl	Cl	6-CH_3
H	H	H	H	2-Cl
CH_3	H	H	H	2-Cl
CH_3	CH_3	H	H	2-Cl
H	H	CH_3	H	2-Cl
CH_3	H	CH_3	H	2-Cl
CH_3	CH_3	CH_3	H	2-Cl
H	H	Cl	H	2-Cl
CH_3	H	Cl	H	2-Cl
CH_3	CH_3	Cl	H	2-Cl
H	H	H	CH_3	2-Cl
CH_3	H	H	CH_3	2-Cl
CH_3	CH_3	H	CH_3	2-Cl
H	H	CH_3	CH_3	2-Cl
CH_3	H	CH_3	CH_3	2-Cl
CH_3	CH_3	CH_3	CH_3	2-Cl
H	H	Cl	CH_3	2-Cl
CH_3	H	Cl	CH_3	2-Cl
CH_3	CH_3	Cl	CH_3	2-Cl
H	H	H	Cl	2-Cl

CH_3	H	H	Cl	2-Cl
CH_3	CH_3	H	Cl	2-Cl
H	H	CH_3	Cl	2-Cl
CH_3	H	CH_3	Cl	2-Cl
CH_3	CH_3	CH_3	Cl	2-Cl
H	H	Cl	Cl	2-Cl
CH_3	H	Cl	Cl	2-Cl
CH_3	CH_3	Cl	Cl	2-Cl

Table 12



R^a	R^b	R^1	R^2	m	R^{17}	R^{18}
CH_3	CH_3	H	H	1	H	H
H	CH_3CH_2	H	H	1	H	H
CH_3	CH_3	CH_3	H	1	H	H
H	CH_3CH_2	CH_3	H	1	H	H
CH_3	CH_3	Cl	H	1	H	H
H	CH_3CH_2	Cl	H	1	H	H
CH_3	CH_3	H	CH_3	1	H	H
H	CH_3CH_2	H	CH_3	1	H	H
CH_3	CH_3	CH_3	CH_3	1	H	H
H	CH_3CH_2	CH_3	CH_3	1	H	H
CH_3	CH_3	Cl	CH_3	1	H	H
H	CH_3CH_2	Cl	CH_3	1	H	H
CH_3	CH_3	H	Cl	1	H	H
H	CH_3CH_2	H	Cl	1	H	H
CH_3	CH_3	CH_3	Cl	1	H	H
H	CH_3CH_2	CH_3	Cl	1	H	H
CH_3	CH_3	Cl	Cl	1	H	H
H	CH_3CH_2	Cl	Cl	1	H	H
CH_3	CH_3	H	H	1	CH_3	H
H	CH_3CH_2	H	H	1	CH_3	H

CH_3	CH_3	CH_3	H	I	CH_3	H
H	CH_3CH_2	CH_3	H	I	CH_3	H
CH_3	CH_3	Cl	H	I	CH_3	H
H	CH_3CH_2	Cl	H	I	CH_3	H
CH_3	CH_3	H	CH_3	I	CH_3	H
H	CH_3CH_2	H	CH_3	I	CH_3	H
CH_3	CH_3	CH_3	CH_3	I	CH_3	H
H	CH_3CH_2	CH_3	CH_3	I	CH_3	H
CH_3	CH_3	Cl	CH_3	I	CH_3	H
H	CH_3CH_2	Cl	CH_3	I	CH_3	H
CH_3	CH_3	H	Cl	I	CH_3	H
H	CH_3CH_2	H	Cl	I	CH_3	H
CH_3	CH_3	CH_3	Cl	I	CH_3	H
H	CH_3CH_2	CH_3	Cl	I	CH_3	H
CH_3	CH_3	Cl	Cl	I	CH_3	H
H	CH_3CH_2	Cl	Cl	I	CH_3	H
CH_3	CH_3	H	H	I	CH_3CH_2	H
H	CH_3CH_2	H	H	I	CH_3CH_2	H
CH_3	CH_3	CH_3	H	I	CH_3CH_2	H
H	CH_3CH_2	CH_3	H	I	CH_3CH_2	H
CH_3	CH_3	Cl	H	I	CH_3CH_2	H
H	CH_3CH_2	Cl	H	I	CH_3CH_2	H
CH_3	CH_3	H	CH_3	I	CH_3CH_2	H
H	CH_3CH_2	H	CH_3	I	CH_3CH_2	H
CH_3	CH_3	CH_3	CH_3	I	CH_3CH_2	H
H	CH_3CH_2	CH_3	CH_3	I	CH_3CH_2	H
CH_3	CH_3	Cl	CH_3	I	CH_3CH_2	H
H	CH_3CH_2	Cl	CH_3	I	CH_3CH_2	H
CH_3	CH_3	H	Cl	I	CH_3CH_2	H
H	CH_3CH_2	H	Cl	I	CH_3CH_2	H
CH_3	CH_3	CH_3	Cl	I	CH_3CH_2	H
H	CH_3CH_2	CH_3	Cl	I	CH_3CH_2	H
CH_3	CH_3	Cl	Cl	I	CH_3CH_2	H
H	CH_3CH_2	Cl	Cl	I	CH_3CH_2	H
CH_3	CH_3	H	H	I	$CH_3CH_2CH_2$	H
H	CH_3CH_2	H	H	I	$CH_3CH_2CH_2$	H
CH_3	CH_3	CH_3	H	I	$CH_3CH_2CH_2$	H
H	CH_3CH_2	CH_3	H	I	$CH_3CH_2CH_2$	H

CH_3	CH_3	Cl	H	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	Cl	H	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	H	CH_3	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	H	CH_3	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	CH_3	CH_3	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	CH_3	CH_3	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	Cl	CH_3	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	H	Cl	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	H	Cl	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	CH_3	Cl	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	CH_3	Cl	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	Cl	Cl	1	$CH_3CH_2CH_2$	H
H	CH_3CH_2	Cl	Cl	1	$CH_3CH_2CH_2$	H
CH_3	CH_3	H	H	1	H	CH_3
H	CH_3CH_2	H	H	1	H	CH_3
CH_3	CH_3	CH_3	H	1	H	CH_3
H	CH_3CH_2	CH_3	H	1	H	CH_3
CH_3	CH_3	Cl	H	1	H	CH_3
H	CH_3CH_2	Cl	H	1	H	CH_3
CH_3	CH_3	H	CH_3	1	H	CH_3
H	CH_3CH_2	H	CH_3	1	H	CH_3
CH_3	CH_3	CH_3	CH_3	1	H	CH_3
H	CH_3CH_2	CH_3	CH_3	1	H	CH_3
CH_3	CH_3	Cl	CH_3	1	H	CH_3
H	CH_3CH_2	Cl	CH_3	1	H	CH_3
CH_3	CH_3	H	Cl	1	H	CH_3
H	CH_3CH_2	H	Cl	1	H	CH_3
CH_3	CH_3	CH_3	Cl	1	H	CH_3
H	CH_3CH_2	CH_3	Cl	1	H	CH_3
CH_3	CH_3	Cl	Cl	1	H	CH_3
H	CH_3CH_2	Cl	Cl	1	H	CH_3
CH_3	CH_3	H	H	1	CH_3	CH_3
H	CH_3CH_2	H	H	1	CH_3	CH_3
CH_3	CH_3	CH_3	H	1	CH_3	CH_3
H	CH_3CH_2	CH_3	H	1	CH_3	CH_3
CH_3	CH_3	Cl	H	1	CH_3	CH_3
H	CH_3CH_2	Cl	H	1	CH_3	CH_3

CH_3	CH_3	H	CH_3	I	CH_3	CH_3
H	CH_3CH_2	H	CH_3	I	CH_3	CH_3
CH_3	CH_3	CH_3	CH_3	I	CH_3	CH_3
H	CH_3CH_2	CH_3	CH_3	I	CH_3	CH_3
CH_3	CH_3	Cl	CH_3	I	CH_3	CH_3
H	CH_3CH_2	Cl	CH_3	I	CH_3	CH_3
CH_3	CH_3	H	Cl	I	CH_3	CH_3
H	CH_3CH_2	H	Cl	I	CH_3	CH_3
CH_3	CH_3	CH_3	Cl	I	CH_3	CH_3
H	CH_3CH_2	CH_3	Cl	I	CH_3	CH_3
CH_3	CH_3	Cl	Cl	I	CH_3	CH_3
H	CH_3CH_2	Cl	Cl	I	CH_3	CH_3
CH_3	CH_3	H	H	I	CH_3CH_2	CH_3
H	CH_3CH_2	H	H	I	CH_3CH_2	CH_3
CH_3	CH_3	CH_3	H	I	CH_3CH_2	CH_3
H	CH_3CH_2	CH_3	H	I	CH_3CH_2	CH_3
CH_3	CH_3	Cl	H	I	CH_3CH_2	CH_3
H	CH_3CH_2	Cl	H	I	CH_3CH_2	CH_3
CH_3	CH_3	H	CH_3	I	CH_3CH_2	CH_3
H	CH_3CH_2	H	CH_3	I	CH_3CH_2	CH_3
CH_3	CH_3	CH_3	CH_3	I	CH_3CH_2	CH_3
H	CH_3CH_2	CH_3	CH_3	I	CH_3CH_2	CH_3
CH_3	CH_3	Cl	CH_3	I	CH_3CH_2	CH_3
H	CH_3CH_2	Cl	CH_3	I	CH_3CH_2	CH_3
CH_3	CH_3	H	Cl	I	CH_3CH_2	CH_3
H	CH_3CH_2	H	Cl	I	CH_3CH_2	CH_3
CH_3	CH_3	CH_3	Cl	I	CH_3CH_2	CH_3
H	CH_3CH_2	CH_3	Cl	I	CH_3CH_2	CH_3
CH_3	CH_3	Cl	Cl	I	CH_3CH_2	CH_3
H	CH_3CH_2	Cl	Cl	I	CH_3CH_2	CH_3
CH_3	CH_3	H	H	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	H	H	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	CH_3	H	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	CH_3	H	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	Cl	H	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	Cl	H	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	H	CH_3	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	H	CH_3	I	$CH_3CH_2CH_2$	CH_3

CH_3	CH_3	CH_3	CH_3	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	CH_3	CH_3	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	Cl	CH_3	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	Cl	CH_3	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	H	Cl	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	H	Cl	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	CH_3	Cl	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	CH_3	Cl	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	Cl	Cl	I	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	Cl	Cl	I	$CH_3CH_2CH_2$	CH_3
CH_3	CH_3	H	H	I	H	Cl
H	CH_3CH_2	H	H	I	H	Cl
CH_3	CH_3	CH_3	H	I	H	Cl
H	CH_3CH_2	CH_3	H	I	H	Cl
CH_3	CH_3	Cl	H	I	H	Cl
H	CH_3CH_2	Cl	H	I	H	Cl
CH_3	CH_3	H	CH_3	I	H	Cl
H	CH_3CH_2	H	CH_3	I	H	Cl
CH_3	CH_3	CH_3	CH_3	I	H	Cl
H	CH_3CH_2	CH_3	CH_3	I	H	Cl
CH_3	CH_3	Cl	CH_3	I	H	Cl
H	CH_3CH_2	Cl	CH_3	I	H	Cl
CH_3	CH_3	H	Cl	I	H	Cl
H	CH_3CH_2	H	Cl	I	H	Cl
CH_3	CH_3	CH_3	Cl	I	H	Cl
H	CH_3CH_2	CH_3	Cl	I	H	Cl
CH_3	CH_3	Cl	Cl	I	H	Cl
H	CH_3CH_2	Cl	Cl	I	H	Cl
CH_3	CH_3	H	H	I	CH_3	Cl
H	CH_3CH_2	H	H	I	CH_3	Cl
CH_3	CH_3	CH_3	H	I	CH_3	Cl
H	CH_3CH_2	CH_3	H	I	CH_3	Cl
CH_3	CH_3	Cl	H	I	CH_3	Cl
H	CH_3CH_2	Cl	H	I	CH_3	Cl
CH_3	CH_3	H	CH_3	I	CH_3	Cl
H	CH_3CH_2	H	CH_3	I	CH_3	Cl
CH_3	CH_3	CH_3	CH_3	I	CH_3	Cl
H	CH_3CH_2	CH_3	CH_3	I	CH_3	Cl

CH_3	CH_3	Cl	CH_3	1	CH_3	Cl
H	CH_3CH_2	Cl	CH_3	1	CH_3	Cl
CH_3	CH_3	H	Cl	1	CH_3	Cl
H	CH_3CH_2	H	Cl	1	CH_3	Cl
CH_3	CH_3	CH_3	Cl	1	CH_3	Cl
H	CH_3CH_2	CH_3	Cl	1	CH_3	Cl
CH_3	CH_3	Cl	Cl	1	CH_3	Cl
H	CH_3CH_2	Cl	Cl	1	CH_3	Cl
CH_3	CH_3	H	H	1	CH_3CH_2	Cl
H	CH_3CH_2	H	H	1	CH_3CH_2	Cl
CH_3	CH_3	CH_3	H	1	CH_3CH_2	Cl
H	CH_3CH_2	CH_3	H	1	CH_3CH_2	Cl
CH_3	CH_3	Cl	H	1	CH_3CH_2	Cl
H	CH_3CH_2	Cl	H	1	CH_3CH_2	Cl
CH_3	CH_3	H	CH_3	1	CH_3CH_2	Cl
H	CH_3CH_2	H	CH_3	1	CH_3CH_2	Cl
CH_3	CH_3	CH_3	CH_3	1	CH_3CH_2	Cl
H	CH_3CH_2	CH_3	CH_3	1	CH_3CH_2	Cl
CH_3	CH_3	Cl	CH_3	1	CH_3CH_2	Cl
H	CH_3CH_2	Cl	CH_3	1	CH_3CH_2	Cl
CH_3	CH_3	H	Cl	1	CH_3CH_2	Cl
H	CH_3CH_2	H	Cl	1	CH_3CH_2	Cl
CH_3	CH_3	CH_3	Cl	1	CH_3CH_2	Cl
H	CH_3CH_2	CH_3	Cl	1	CH_3CH_2	Cl
CH_3	CH_3	Cl	Cl	1	CH_3CH_2	Cl
H	CH_3CH_2	Cl	Cl	1	CH_3CH_2	Cl
CH_3	CH_3	H	H	1	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	H	H	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	CH_3	H	1	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	CH_3	H	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	Cl	H	1	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	Cl	H	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	H	CH_3	1	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	H	CH_3	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	CH_3	CH_3	1	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	CH_3	CH_3	1	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	Cl	CH_3	1	$CH_3CH_2CH_2$	Cl

CH_3	CH_3	H	Cl	I	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	H	Cl	I	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	CH_3	Cl	I	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	CH_3	Cl	I	$CH_3CH_2CH_2$	Cl
CH_3	CH_3	Cl	Cl	I	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	Cl	Cl	I	$CH_3CH_2CH_2$	Cl
H	CH_3	H	H	I	H	H
H	CH_3	CH_3	H	I	H	H
H	CH_3	Cl	H	I	H	H
H	CH_3	H	CH_3	I	H	H
H	CH_3	CH_3	CH_3	I	H	H
H	CH_3	Cl	CH_3	I	H	H
H	CH_3	H	Cl	I	H	H
H	CH_3	CH_3	Cl	I	H	H
H	CH_3	Cl	Cl	I	H	H
H	CH_3	H	H	I	CH_3	H
H	CH_3	CH_3	H	I	CH_3	H
H	CH_3	Cl	H	I	CH_3	H
H	CH_3	H	CH_3	I	CH_3	H
H	CH_3	CH_3	CH_3	I	CH_3	H
H	CH_3	Cl	CH_3	I	CH_3	H
H	CH_3	H	Cl	I	CH_3	H
H	CH_3	CH_3	Cl	I	CH_3	H
H	CH_3	Cl	Cl	I	CH_3	H
H	CH_3	H	H	I	CH_3CH_2	H
H	CH_3	CH_3	H	I	CH_3CH_2	H
H	CH_3	Cl	H	I	CH_3CH_2	H
H	CH_3	H	CH_3	I	CH_3CH_2	H
H	CH_3	CH_3	CH_3	I	CH_3CH_2	H
H	CH_3	Cl	CH_3	I	CH_3CH_2	H
H	CH_3	H	Cl	I	CH_3CH_2	H
H	CH_3	CH_3	Cl	I	CH_3CH_2	H
H	CH_3	Cl	Cl	I	CH_3CH_2	H
H	CH_3	H	H	I	$CH_3CH_2CH_2$	H
H	CH_3	CH_3	H	I	$CH_3CH_2CH_2$	H
H	CH_3	Cl	H	I	$CH_3CH_2CH_2$	H
H	CH_3	H	CH_3	I	$CH_3CH_2CH_2$	H
H	CH_3	CH_3	CH_3	I	$CH_3CH_2CH_2$	H

H	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	H
H	CH_3	H	Cl	1	$CH_3CH_2CH_2$	H
H	CH_3	CH_3	Cl	1	$CH_3CH_2CH_2$	H
H	CH_3	Cl	Cl	1	$CH_3CH_2CH_2$	H
H	CH_3	H	H	1	H	CH_3
H	CH_3	CH_3	H	1	H	CH_3
H	CH_3	Cl	H	1	H	CH_3
H	CH_3	H	CH_3	1	H	CH_3
H	CH_3	CH_3	CH_3	1	H	CH_3
H	CH_3	Cl	CH_3	1	H	CH_3
H	CH_3	H	Cl	1	H	CH_3
H	CH_3	CH_3	Cl	1	H	CH_3
H	CH_3	Cl	Cl	1	H	CH_3
H	CH_3	H	H	1	CH_3	CH_3
H	CH_3	CH_3	H	1	CH_3	CH_3
H	CH_3	Cl	H	1	CH_3	CH_3
H	CH_3	H	CH_3	1	CH_3	CH_3
H	CH_3	CH_3	CH_3	1	CH_3	CH_3
H	CH_3	Cl	CH_3	1	CH_3	CH_3
H	CH_3	H	Cl	1	CH_3	CH_3
H	CH_3	CH_3	Cl	1	CH_3	CH_3
H	CH_3	Cl	Cl	1	CH_3	CH_3
H	CH_3	H	H	1	CH_3CH_2	CH_3
H	CH_3	CH_3	H	1	CH_3CH_2	CH_3
H	CH_3	Cl	H	1	CH_3CH_2	CH_3
H	CH_3	H	CH_3	1	CH_3CH_2	CH_3
H	CH_3	CH_3	CH_3	1	CH_3CH_2	CH_3
H	CH_3	Cl	CH_3	1	CH_3CH_2	CH_3
H	CH_3	H	Cl	1	CH_3CH_2	CH_3
H	CH_3	CH_3	Cl	1	CH_3CH_2	CH_3
H	CH_3	Cl	Cl	1	CH_3CH_2	CH_3
H	CH_3	H	H	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	CH_3	H	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	Cl	H	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	H	CH_3	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	CH_3	CH_3	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	H	Cl	1	$CH_3CH_2CH_2$	CH_3

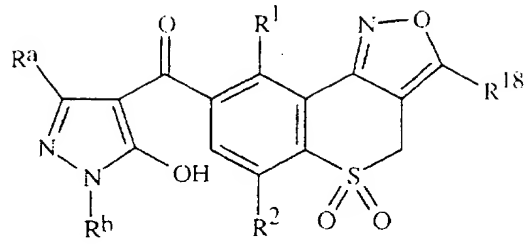
H	CH_3	CH_3	Cl	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	Cl	Cl	1	$CH_3CH_2CH_2$	CH_3
H	CH_3	H	H	1	H	Cl
H	CH_3	CH_3	H	1	H	Cl
H	CH_3	Cl	H	1	H	Cl
H	CH_3	H	CH_3	1	H	Cl
H	CH_3	CH_3	CH_3	1	H	Cl
H	CH_3	Cl	CH_3	1	H	Cl
H	CH_3	H	Cl	1	H	Cl
H	CH_3	CH_3	Cl	1	H	Cl
H	CH_3	Cl	Cl	1	H	Cl
H	CH_3	H	H	1	CH_3	Cl
H	CH_3	CH_3	H	1	CH_3	Cl
H	CH_3	Cl	H	1	CH_3	Cl
H	CH_3	H	CH_3	1	CH_3	Cl
H	CH_3	CH_3	CH_3	1	CH_3	Cl
H	CH_3	Cl	CH_3	1	CH_3	Cl
H	CH_3	H	Cl	1	CH_3	Cl
H	CH_3	CH_3	Cl	1	CH_3	Cl
H	CH_3	Cl	Cl	1	CH_3	Cl
H	CH_3	H	H	1	CH_3CH_2	Cl
H	CH_3	CH_3	H	1	CH_3CH_2	Cl
H	CH_3	Cl	H	1	CH_3CH_2	Cl
H	CH_3	H	CH_3	1	CH_3CH_2	Cl
H	CH_3	CH_3	CH_3	1	CH_3CH_2	Cl
H	CH_3	Cl	CH_3	1	CH_3CH_2	Cl
H	CH_3	H	Cl	1	CH_3CH_2	Cl
H	CH_3	CH_3	Cl	1	CH_3CH_2	Cl
H	CH_3	Cl	Cl	1	CH_3CH_2	Cl
H	CH_3	H	H	1	$CH_3CH_2CH_2$	Cl
H	CH_3	CH_3	H	1	$CH_3CH_2CH_2$	Cl
H	CH_3	Cl	H	1	$CH_3CH_2CH_2$	Cl
H	CH_3	H	CH_3	1	$CH_3CH_2CH_2$	Cl
H	CH_3	CH_3	CH_3	1	$CH_3CH_2CH_2$	Cl
H	CH_3	Cl	CH_3	1	$CH_3CH_2CH_2$	Cl
H	CH_3	H	Cl	1	$CH_3CH_2CH_2$	Cl
H	CH_3	CH_3	Cl	1	$CH_3CH_2CH_2$	Cl
H	CH_3	Cl	Cl	1	$CH_3CH_2CH_2$	Cl

H	CH_3CH_2	H	H	2	H	H
H	CH_3CH_2	CH_3	H	2	H	H
H	CH_3CH_2	Cl	H	2	H	H
H	CH_3CH_2	H	CH_3	2	H	H
H	CH_3CH_2	CH_3	CH_3	2	H	H
H	CH_3CH_2	Cl	CH_3	2	H	H
H	CH_3CH_2	H	Cl	2	H	H
H	CH_3CH_2	CH_3	Cl	2	H	H
H	CH_3CH_2	Cl	Cl	2	H	H
H	CH_3CH_2	H	H	2	CH_3	H
H	CH_3CH_2	CH_3	H	2	CH_3	H
H	CH_3CH_2	Cl	H	2	CH_3	H
H	CH_3CH_2	H	CH_3	2	CH_3	H
H	CH_3CH_2	CH_3	CH_3	2	CH_3	H
H	CH_3CH_2	Cl	CH_3	2	CH_3	H
H	CH_3CH_2	H	Cl	2	CH_3	H
H	CH_3CH_2	CH_3	Cl	2	CH_3	H
H	CH_3CH_2	Cl	Cl	2	CH_3	H
H	CH_3CH_2	H	H	2	CH_3CH_2	H
H	CH_3CH_2	CH_3	H	2	CH_3CH_2	H
H	CH_3CH_2	Cl	H	2	CH_3CH_2	H
H	CH_3CH_2	H	CH_3	2	CH_3CH_2	H
H	CH_3CH_2	CH_3	CH_3	2	CH_3CH_2	H
H	CH_3CH_2	Cl	CH_3	2	CH_3CH_2	H
H	CH_3CH_2	H	Cl	2	CH_3CH_2	H
H	CH_3CH_2	CH_3	Cl	2	CH_3CH_2	H
H	CH_3CH_2	Cl	Cl	2	CH_3CH_2	H
H	CH_3CH_2	H	H	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	CH_3	H	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	Cl	H	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	H	CH_3	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	CH_3	CH_3	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	Cl	CH_3	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	H	Cl	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	CH_3	Cl	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	Cl	Cl	2	$CH_3CH_2CH_2$	H
H	CH_3CH_2	H	H	2	H	CH_3
H	CH_3CH_2	CH_3	H	2	H	CH_3

H	CH_3CH_2	Cl	H	2	H	CH_3
H	CH_3CH_2	H	CH_3	2	H	CH_3
H	CH_3CH_2	CH_3	CH_3	2	H	CH_3
H	CH_3CH_2	Cl	CH_3	2	H	CH_3
H	CH_3CH_2	H	Cl	2	H	CH_3
H	CH_3CH_2	CH_3	Cl	2	H	CH_3
H	CH_3CH_2	Cl	Cl	2	H	CH_3
H	CH_3CH_2	H	H	2	CH_3	CH_3
H	CH_3CH_2	CH_3	H	2	CH_3	CH_3
H	CH_3CH_2	Cl	H	2	CH_3	CH_3
H	CH_3CH_2	H	CH_3	2	CH_3	CH_3
H	CH_3CH_2	CH_3	CH_3	2	CH_3	CH_3
H	CH_3CH_2	Cl	CH_3	2	CH_3	CH_3
H	CH_3CH_2	H	Cl	2	CH_3	CH_3
H	CH_3CH_2	CH_3	Cl	2	CH_3	CH_3
H	CH_3CH_2	Cl	Cl	2	CH_3	CH_3
H	CH_3CH_2	H	H	2	CH_3CH_2	CH_3
H	CH_3CH_2	CH_3	H	2	CH_3CH_2	CH_3
H	CH_3CH_2	Cl	H	2	CH_3CH_2	CH_3
H	CH_3CH_2	H	CH_3	2	CH_3CH_2	CH_3
H	CH_3CH_2	CH_3	CH_3	2	CH_3CH_2	CH_3
H	CH_3CH_2	Cl	CH_3	2	CH_3CH_2	CH_3
H	CH_3CH_2	H	Cl	2	CH_3CH_2	CH_3
H	CH_3CH_2	CH_3	Cl	2	CH_3CH_2	CH_3
H	CH_3CH_2	Cl	Cl	2	CH_3CH_2	CH_3
H	CH_3CH_2	H	H	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	CH_3	H	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	Cl	H	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	H	CH_3	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	CH_3	CH_3	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	Cl	CH_3	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	H	Cl	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	CH_3	Cl	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	Cl	Cl	2	$CH_3CH_2CH_2$	CH_3
H	CH_3CH_2	H	H	2	H	Cl
H	CH_3CH_2	CH_3	H	2	H	Cl
H	CH_3CH_2	Cl	H	2	H	Cl
H	CH_3CH_2	H	CH_3	2	H	Cl

H	CH_3CH_2	CH_3	CH_3	2	H	Cl
H	CH_3CH_2	Cl	CH_3	2	H	Cl
H	CH_3CH_2	H	Cl	2	H	Cl
H	CH_3CH_2	CH_3	Cl	2	H	Cl
H	CH_3CH_2	Cl	Cl	2	H	Cl
H	CH_3CH_2	H	H	2	CH_3	Cl
H	CH_3CH_2	CH_3	H	2	CH_3	Cl
H	CH_3CH_2	Cl	H	2	CH_3	Cl
H	CH_3CH_2	H	CH_3	2	CH_3	Cl
H	CH_3CH_2	CH_3	CH_3	2	CH_3	Cl
H	CH_3CH_2	Cl	CH_3	2	CH_3	Cl
H	CH_3CH_2	H	Cl	2	CH_3	Cl
H	CH_3CH_2	CH_3	Cl	2	CH_3	Cl
H	CH_3CH_2	Cl	Cl	2	CH_3	Cl
H	CH_3CH_2	H	H	2	CH_3CH_2	Cl
H	CH_3CH_2	CH_3	H	2	CH_3CH_2	Cl
H	CH_3CH_2	Cl	H	2	CH_3CH_2	Cl
H	CH_3CH_2	H	CH_3	2	CH_3CH_2	Cl
H	CH_3CH_2	CH_3	CH_3	2	CH_3CH_2	Cl
H	CH_3CH_2	Cl	CH_3	2	CH_3CH_2	Cl
H	CH_3CH_2	H	Cl	2	CH_3CH_2	Cl
H	CH_3CH_2	CH_3	Cl	2	CH_3CH_2	Cl
H	CH_3CH_2	Cl	Cl	2	CH_3CH_2	Cl
H	CH_3CH_2	H	H	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	CH_3	H	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	Cl	H	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	H	CH_3	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	CH_3	CH_3	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	Cl	CH_3	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	H	Cl	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	CH_3	Cl	2	$CH_3CH_2CH_2$	Cl
H	CH_3CH_2	Cl	Cl	2	$CH_3CH_2CH_2$	Cl

Table 13

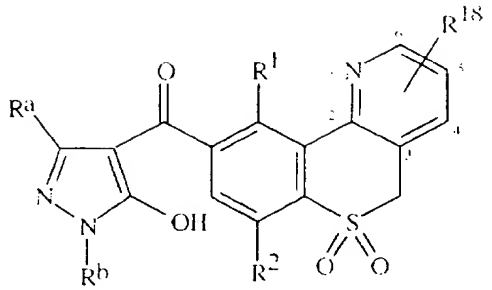


R^a	R^b	R^1	R^2	R^{18}
CH_3	CH_3	H	H	H
H	CH_3CH_2	H	H	H
CH_3	CH_3	CH_3	H	H
H	CH_3CH_2	CH_3	H	H
CH_3	CH_3	Cl	H	H
H	CH_3CH_2	Cl	H	H
CH_3	CH_3	H	CH_3	H
H	CH_3CH_2	H	CH_3	H
CH_3	CH_3	CH_3	CH_3	H
H	CH_3CH_2	CH_3	CH_3	H
CH_3	CH_3	Cl	CH_3	H
H	CH_3CH_2	Cl	CH_3	H
CH_3	CH_3	H	Cl	H
H	CH_3CH_2	H	Cl	H
CH_3	CH_3	CH_3	Cl	H
H	CH_3CH_2	CH_3	Cl	H
CH_3	CH_3	Cl	Cl	H
H	CH_3CH_2	Cl	Cl	H
CH_3	CH_3	H	H	CH_3
H	CH_3CH_2	H	H	CH_3
CH_3	CH_3	CH_3	H	CH_3
H	CH_3CH_2	CH_3	H	CH_3
CH_3	CH_3	Cl	H	CH_3
H	CH_3CH_2	Cl	H	CH_3
CH_3	CH_3	H	CH_3	CH_3
H	CH_3CH_2	H	CH_3	CH_3
CH_3	CH_3	CH_3	CH_3	CH_3
H	CH_3CH_2	CH_3	CH_3	CH_3

CH_3	CH_3	Cl	CH_3	CH_3
H	CH_3CH_2	Cl	CH_3	CH_3
CH_3	CH_3	H	Cl	CH_3
H	CH_3CH_2	H	Cl	CH_3
CH_3	CH_3	CH_3	Cl	CH_3
H	CH_3CH_2	CH_3	Cl	CH_3
CH_3	CH_3	Cl	Cl	CH_3
H	CH_3CH_2	Cl	Cl	CH_3
CH_3	CH_3	H	H	Cl
H	CH_3CH_2	H	H	Cl
CH_3	CH_3	CH_3	H	Cl
H	CH_3CH_2	CH_3	H	Cl
CH_3	CH_3	Cl	H	Cl
H	CH_3CH_2	Cl	H	Cl
CH_3	CH_3	H	CH_3	Cl
H	CH_3CH_2	H	CH_3	Cl
CH_3	CH_3	CH_3	CH_3	Cl
H	CH_3CH_2	CH_3	CH_3	Cl
CH_3	CH_3	Cl	CH_3	Cl
H	CH_3CH_2	Cl	CH_3	Cl
CH_3	CH_3	H	Cl	Cl
H	CH_3CH_2	H	Cl	Cl
CH_3	CH_3	CH_3	Cl	Cl
H	CH_3CH_2	CH_3	Cl	Cl
CH_3	CH_3	Cl	Cl	Cl
H	CH_3CH_2	Cl	Cl	Cl
H	CH_3	H	H	H
H	CH_3	CH_3	H	H
H	CH_3	Cl	H	H
H	CH_3	H	CH_3	H
H	CH_3	CH_3	CH_3	H
H	CH_3	Cl	CH_3	H
H	CH_3	H	Cl	H
H	CH_3	CH_3	Cl	H
H	CH_3	Cl	Cl	H
H	CH_3	H	H	CH_3
H	CH_3	CH_3	H	CH_3
H	CH_3	Cl	H	CH_3

H	CH_3	H	CH_3	CH_3
H	CH_3	CH_3	CH_3	CH_3
H	CH_3	Cl	CH_3	CH_3
H	CH_3	H	Cl	CH_3
H	CH_3	CH_3	Cl	CH_3
H	CH_3	Cl	Cl	CH_3
H	CH_3	H	H	Cl
H	CH_3	CH_3	H	Cl
H	CH_3	Cl	H	Cl
H	CH_3	H	CH_3	Cl
H	CH_3	CH_3	CH_3	Cl
H	CH_3	Cl	CH_3	Cl
H	CH_3	H	Cl	Cl
H	CH_3	CH_3	Cl	Cl
H	CH_3	Cl	Cl	Cl

Table 14



R^a	R^b	R^1	R^2	R^{18}
CH_3	CH_3	H	H	H
H	CH_3CH_2	H	H	H
CH_3	CH_3	CH_3	H	H
H	CH_3CH_2	CH_3	H	H
CH_3	CH_3	Cl	H	H
H	CH_3CH_2	Cl	H	H
CH_3	CH_3	H	CH_3	H
H	CH_3CH_2	H	CH_3	H
CH_3	CH_3	CH_3	CH_3	H
H	CH_3CH_2	CH_3	CH_3	H
CH_3	CH_3	Cl	CH_3	H
H	CH_3CH_2	Cl	CH_3	H
CH_3	CH_3	H	Cl	H

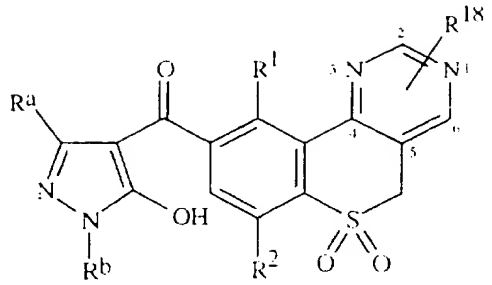
H	CH_3CH_2	H	Cl	H
CH_3	CH_3	CH_3	Cl	H
H	CH_3CH_2	CH_3	Cl	H
CH_3	CH_3	Cl	Cl	H
H	CH_3CH_2	Cl	Cl	H
CH_3	CH_3	H	H	6-CH_3
H	CH_3CH_2	H	H	6-CH_3
CH_3	CH_3	CH_3	H	6-CH_3
H	CH_3CH_2	CH_3	H	6-CH_3
CH_3	CH_3	Cl	H	6-CH_3
H	CH_3CH_2	Cl	H	6-CH_3
CH_3	CH_3	H	CH_3	6-CH_3
H	CH_3CH_2	H	CH_3	6-CH_3
CH_3	CH_3	CH_3	CH_3	6-CH_3
H	CH_3CH_2	CH_3	CH_3	6-CH_3
CH_3	CH_3	Cl	CH_3	6-CH_3
H	CH_3CH_2	Cl	CH_3	6-CH_3
CH_3	CH_3	H	Cl	6-CH_3
H	CH_3CH_2	H	Cl	6-CH_3
CH_3	CH_3	CH_3	Cl	6-CH_3
H	CH_3CH_2	CH_3	Cl	6-CH_3
CH_3	CH_3	Cl	Cl	6-CH_3
H	CH_3CH_2	Cl	Cl	6-CH_3
CH_3	CH_3	H	H	5-CH_3
H	CH_3CH_2	H	H	5-CH_3
CH_3	CH_3	CH_3	H	5-CH_3
H	CH_3CH_2	CH_3	H	5-CH_3
CH_3	CH_3	Cl	H	5-CH_3
H	CH_3CH_2	Cl	H	5-CH_3
CH_3	CH_3	H	CH_3	5-CH_3
H	CH_3CH_2	H	CH_3	5-CH_3
CH_3	CH_3	CH_3	CH_3	5-CH_3
H	CH_3CH_2	CH_3	CH_3	5-CH_3
CH_3	CH_3	Cl	CH_3	5-CH_3
H	CH_3CH_2	Cl	CH_3	5-CH_3
CH_3	CH_3	H	Cl	5-CH_3
H	CH_3CH_2	H	Cl	5-CH_3
CH_3	CH_3	CH_3	Cl	5 CH_3

H	CH_3CH_2	CH_3	Cl	5-CH_3
CH_3	CH_3	Cl	Cl	5-CH_3
H	CH_3CH_2	Cl	Cl	5-CH_3
CH_3	CH_3	H	H	4-CH_3
H	CH_3CH_2	H	H	4-CH_3
CH_3	CH_3	CH_3	H	4-CH_3
H	CH_3CH_2	CH_3	H	4-CH_3
CH_3	CH_3	Cl	H	4-CH_3
H	CH_3CH_2	Cl	H	4-CH_3
CH_3	CH_3	H	CH_3	4-CH_3
H	CH_3CH_2	H	CH_3	4-CH_3
CH_3	CH_3	CH_3	CH_3	4-CH_3
H	CH_3CH_2	CH_3	CH_3	4-CH_3
CH_3	CH_3	Cl	CH_3	4-CH_3
H	CH_3CH_2	Cl	CH_3	4-CH_3
CH_3	CH_3	H	Cl	4-CH_3
H	CH_3CH_2	H	Cl	4-CH_3
CH_3	CH_3	CH_3	Cl	4-CH_3
H	CH_3CH_2	CH_3	Cl	4-CH_3
CH_3	CH_3	Cl	Cl	4-CH_3
H	CH_3CH_2	Cl	Cl	4-CH_3
CH_3	CH_3	H	H	6-Cl
H	CH_3CH_2	H	H	6-Cl
CH_3	CH_3	CH_3	H	6-Cl
H	CH_3CH_2	CH_3	H	6-Cl
CH_3	CH_3	Cl	H	6-Cl
H	CH_3CH_2	Cl	H	6-Cl
CH_3	CH_3	H	CH_3	6-Cl
H	CH_3CH_2	H	CH_3	6-Cl
CH_3	CH_3	CH_3	CH_3	6-Cl
H	CH_3CH_2	CH_3	CH_3	6-Cl
CH_3	CH_3	Cl	CH_3	6-Cl
H	CH_3CH_2	Cl	CH_3	6-Cl
CH_3	CH_3	H	Cl	6-Cl
H	CH_3CH_2	H	Cl	6-Cl
CH_3	CH_3	CH_3	Cl	6-Cl
H	CH_3CH_2	CH_3	Cl	6-Cl
CH_3	CH_3	Cl	Cl	6-Cl

H	CH_3CH_2	Cl	Cl	6-Cl
CH_3	CH_3	H	H	4-Cl
H	CH_3CH_2	H	H	4-Cl
CH_3	CH_3	CH_3	H	4-Cl
H	CH_3CH_2	CH_3	H	4-Cl
CH_3	CH_3	Cl	H	4-Cl
H	CH_3CH_2	Cl	H	4-Cl
CH_3	CH_3	H	CH_3	4-Cl
H	CH_3CH_2	H	CH_3	4-Cl
CH_3	CH_3	CH_3	CH_3	4-Cl
H	CH_3CH_2	CH_3	CH_3	4-Cl
CH_3	CH_3	Cl	CH_3	4-Cl
H	CH_3CH_2	Cl	CH_3	4-Cl
CH_3	CH_3	H	Cl	4-Cl
H	CH_3CH_2	H	Cl	4-Cl
CH_3	CH_3	CH_3	Cl	4-Cl
H	CH_3CH_2	CH_3	Cl	4-Cl
CH_3	CH_3	Cl	Cl	4-Cl
H	CH_3CH_2	Cl	Cl	4-Cl
H	CH_3	H	H	H
H	CH_3	CH_3	H	H
H	CH_3	Cl	H	H
H	CH_3	H	CH_3	H
H	CH_3	CH_3	CH_3	H
H	CH_3	Cl	CH_3	H
H	CH_3	H	Cl	H
H	CH_3	CH_3	Cl	H
H	CH_3	Cl	Cl	H
H	CH_3	H	H	6-CH_3
H	CH_3	CH_3	H	6-CH_3
H	CH_3	Cl	H	6-CH_3
H	CH_3	H	CH_3	6-CH_3
H	CH_3	CH_3	CH_3	6-CH_3
H	CH_3	Cl	CH_3	6-CH_3
H	CH_3	H	Cl	6-CH_3
H	CH_3	CH_3	Cl	6-CH_3
H	CH_3	Cl	Cl	6-CH_3
H	CH_3	H	H	5-CH_3

H	CH_3	CH_3	H	5-CH_3
H	CH_3	Cl	H	5-CH_3
H	CH_3	H	CH_3	5-CH_3
H	CH_3	CH_3	CH_3	5-CH_3
H	CH_3	Cl	CH_3	5-CH_3
H	CH_3	H	Cl	5-CH_3
H	CH_3	CH_3	Cl	5-CH_3
H	CH_3	Cl	Cl	5-CH_3
H	CH_3	H	H	4-CH_3
H	CH_3	CH_3	H	4-CH_3
H	CH_3	Cl	H	4-CH_3
H	CH_3	H	CH_3	4-CH_3
H	CH_3	CH_3	CH_3	4-CH_3
H	CH_3	Cl	CH_3	4-CH_3
H	CH_3	H	Cl	4-CH_3
H	CH_3	CH_3	Cl	4-CH_3
H	CH_3	Cl	Cl	4-CH_3
H	CH_3	H	H	6-Cl
H	CH_3	CH_3	H	6-Cl
H	CH_3	Cl	H	6-Cl
H	CH_3	H	CH_3	6-Cl
H	CH_3	CH_3	CH_3	6-Cl
H	CH_3	Cl	CH_3	6-Cl
H	CH_3	H	Cl	6-Cl
H	CH_3	CH_3	Cl	6-Cl
H	CH_3	Cl	Cl	6-Cl
H	CH_3	H	H	4-Cl
H	CH_3	CH_3	H	4-Cl
H	CH_3	Cl	H	4-Cl
H	CH_3	H	CH_3	4-Cl
H	CH_3	CH_3	CH_3	4-Cl
H	CH_3	Cl	CH_3	4-Cl
H	CH_3	H	Cl	4-Cl
H	CH_3	CH_3	Cl	4-Cl
H	CH_3	Cl	Cl	4-Cl

Table 15



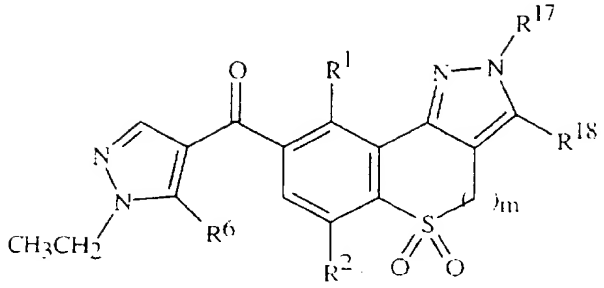
R^a	R^b	R^1	R^2	R^{18}
CH_3	CH_3	H	H	H
H	CH_3CH_2	H	H	H
CH_3	CH_3	CH_3	H	H
H	CH_3CH_2	CH_3	H	H
CH_3	CH_3	Cl	H	H
H	CH_3CH_2	Cl	H	H
CH_3	CH_3	H	CH_3	H
H	CH_3CH_2	H	CH_3	H
CH_3	CH_3	CH_3	CH_3	H
H	CH_3CH_2	CH_3	CH_3	H
CH_3	CH_3	Cl	CH_3	H
H	CH_3CH_2	Cl	CH_3	H
CH_3	CH_3	H	Cl	H
H	CH_3CH_2	H	Cl	H
CH_3	CH_3	CH_3	Cl	H
H	CH_3CH_2	CH_3	Cl	H
CH_3	CH_3	Cl	Cl	H
H	CH_3CH_2	Cl	Cl	H
CH_3	CH_3	H	H	2-CH_3
H	CH_3CH_2	H	H	2-CH_3
CH_3	CH_3	CH_3	H	2-CH_3
H	CH_3CH_2	CH_3	H	2-CH_3
CH_3	CH_3	Cl	H	2-CH_3
H	CH_3CH_2	Cl	H	2-CH_3
CH_3	CH_3	H	CH_3	2-CH_3
H	CH_3CH_2	H	CH_3	2-CH_3
CH_3	CH_3	CH_3	CH_3	2-CH_3
H	CH_3CH_2	CH_3	CH_3	2-CH_3

CH_3	CH_3	Cl	CH_3	2-CH_3
H	CH_3CH_2	Cl	CH_3	2-CH_3
CH_3	CH_3	H	Cl	2-CH_3
H	CH_3CH_2	H	Cl	2-CH_3
CH_3	CH_3	CH_3	Cl	2-CH_3
H	CH_3CH_2	CH_3	Cl	2-CH_3
CH_3	CH_3	Cl	Cl	2-CH_3
H	CH_3CH_2	Cl	Cl	2-CH_3
CH_3	CH_3	H	H	6-CH_3
H	CH_3CH_2	H	H	6-CH_3
CH_3	CH_3	CH_3	H	6-CH_3
H	CH_3CH_2	CH_3	H	6-CH_3
CH_3	CH_3	Cl	H	6-CH_3
H	CH_3CH_2	Cl	H	6-CH_3
CH_3	CH_3	H	CH_3	6-CH_3
H	CH_3CH_2	H	CH_3	6-CH_3
CH_3	CH_3	CH_3	CH_3	6-CH_3
H	CH_3CH_2	CH_3	CH_3	6-CH_3
CH_3	CH_3	Cl	CH_3	6-CH_3
H	CH_3CH_2	Cl	CH_3	6-CH_3
CH_3	CH_3	H	Cl	6-CH_3
H	CH_3CH_2	H	Cl	6-CH_3
CH_3	CH_3	CH_3	Cl	6-CH_3
H	CH_3CH_2	CH_3	Cl	6-CH_3
CH_3	CH_3	Cl	Cl	6-CH_3
H	CH_3CH_2	Cl	Cl	6-CH_3
CH_3	CH_3	H	H	2-Cl
H	CH_3CH_2	H	H	2-Cl
CH_3	CH_3	CH_3	H	2-Cl
H	CH_3CH_2	CH_3	H	2-Cl
CH_3	CH_3	Cl	H	2-Cl
H	CH_3CH_2	Cl	H	2-Cl
CH_3	CH_3	H	CH_3	2-Cl
H	CH_3CH_2	H	CH_3	2-Cl
CH_3	CH_3	CH_3	CH_3	2-Cl
H	CH_3CH_2	CH_3	CH_3	2-Cl
CH_3	CH_3	Cl	CH_3	2-Cl
H	CH_3CH_2	Cl	CH_3	2-Cl

CH_3	CH_3	H	Cl	2-Cl
H	CH_3CH_2	H	Cl	2-Cl
CH_3	CH_3	CH_3	Cl	2-Cl
H	CH_3CH_2	CH_3	Cl	2-Cl
CH_3	CH_3	Cl	Cl	2-Cl
H	CH_3CH_2	Cl	Cl	2-Cl
H	CH_3	H	H	H
H	CH_3	CH_3	H	H
H	CH_3	Cl	H	H
H	CH_3	H	CH_3	H
H	CH_3	CH_3	CH_3	H
H	CH_3	Cl	CH_3	H
H	CH_3	H	Cl	H
H	CH_3	CH_3	Cl	H
H	CH_3	Cl	Cl	H
H	CH_3	H	H	2-CH_3
H	CH_3	CH_3	H	2-CH_3
H	CH_3	Cl	H	2-CH_3
H	CH_3	H	CH_3	2-CH_3
H	CH_3	CH_3	CH_3	2-CH_3
H	CH_3	Cl	CH_3	2-CH_3
H	CH_3	H	Cl	2-CH_3
H	CH_3	CH_3	Cl	2-CH_3
H	CH_3	Cl	Cl	2-CH_3
H	CH_3	H	H	6-CH_3
H	CH_3	CH_3	H	6-CH_3
H	CH_3	Cl	H	6-CH_3
H	CH_3	H	CH_3	6-CH_3
H	CH_3	CH_3	CH_3	6-CH_3
H	CH_3	Cl	CH_3	6-CH_3
H	CH_3	H	Cl	6-CH_3
H	CH_3	CH_3	Cl	6-CH_3
H	CH_3	Cl	Cl	6-CH_3
H	CH_3	H	H	2-Cl
H	CH_3	CH_3	H	2-Cl
H	CH_3	Cl	H	2-Cl
H	CH_3	H	CH_3	2-Cl
H	CH_3	CH_3	CH_3	2-Cl

H	CH_3	Cl	CH_3	2-Cl
H	CH_3	H	Cl	2-Cl
H	CH_3	CH_3	Cl	2-Cl
H	CH_3	Cl	Cl	2-Cl

Table 16



R^6	R^1	R^2	m	R^{17}	R^{18}
SH	H	H	1	H	H
Cl	H	H	1	H	H
SH	CH_3	H	1	H	H
Cl	CH_3	H	1	H	H
SH	Cl	H	1	H	H
Cl	Cl	H	1	H	H
SH	CH_3	CH_3	1	H	H
Cl	CH_3	CH_3	1	H	H
SH	Cl	Cl	1	H	H
Cl	Cl	Cl	1	H	H
SH	H	H	2	H	H
Cl	H	H	2	H	H
SH	CH_3	H	2	H	H
Cl	CH_3	H	2	H	H
SH	Cl	H	2	H	H
Cl	Cl	H	2	H	H
SH	CH_3	CH_3	2	H	H
Cl	CH_3	CH_3	2	H	H
SH	Cl	Cl	2	H	H
Cl	Cl	Cl	2	H	H
SH	H	H	1	CH_3	H
Cl	H	H	1	CH_3	H
SH	CH_3	H	1	CH_3	H

Cl	CH_3	H	1	CH_3	H
SH	Cl	H	1	CH_3	H
Cl	Cl	H	1	CH_3	H
SH	CH_3	CH_3	1	CH_3	H
Cl	CH_3	CH_3	1	CH_3	H
SH	Cl	Cl	1	CH_3	H
Cl	Cl	Cl	1	CH_3	H
SH	H	H	2	CH_3	H
Cl	H	H	2	CH_3	H
SH	CH_3	H	2	CH_3	H
Cl	CH_3	H	2	CH_3	H
SH	Cl	H	2	CH_3	H
Cl	Cl	H	2	CH_3	H
SH	CH_3	CH_3	2	CH_3	H
Cl	CH_3	CH_3	2	CH_3	H
SH	Cl	Cl	2	CH_3	H
Cl	Cl	Cl	2	CH_3	H
SH	H	H	1	CH_2CH_3	H
Cl	H	H	1	CH_2CH_3	H
SH	CH_3	H	1	CH_2CH_3	H
Cl	CH_3	H	1	CH_2CH_3	H
SH	Cl	H	1	CH_2CH_3	H
Cl	Cl	H	1	CH_2CH_3	H
SH	CH_3	CH_3	1	CH_2CH_3	H
Cl	CH_3	CH_3	1	CH_2CH_3	H
SH	Cl	Cl	1	CH_2CH_3	H
Cl	Cl	Cl	1	CH_2CH_3	H
SH	H	H	2	CH_2CH_3	H
Cl	H	H	2	CH_2CH_3	H
SH	CH_3	H	2	CH_2CH_3	H
Cl	CH_3	H	2	CH_2CH_3	H
SH	Cl	H	2	CH_2CH_3	H
Cl	Cl	H	2	CH_2CH_3	H
SH	CH_3	CH_3	2	CH_2CH_3	H
Cl	CH_3	CH_3	2	CH_2CH_3	H
SH	Cl	Cl	2	CH_2CH_3	H
Cl	Cl	Cl	2	CH_2CH_3	H
SH	H	H	1	$CH_2CH_2CH_3$	H

Cl	H	H	1	$CH_2CH_2CH_3$	H
SH	CH_3	H	1	$CH_2CH_2CH_3$	H
Cl	CH_3	H	1	$CH_2CH_2CH_3$	H
SH	Cl	H	1	$CH_2CH_2CH_3$	H
Cl	Cl	H	1	$CH_2CH_2CH_3$	H
SH	CH_3	CH_3	1	$CH_2CH_2CH_3$	H
Cl	CH_3	CH_3	1	$CH_2CH_2CH_3$	H
SH	Cl	Cl	1	$CH_2CH_2CH_3$	H
Cl	Cl	Cl	1	$CH_2CH_2CH_3$	H
SH	H	H	2	$CH_2CH_2CH_3$	H
Cl	H	H	2	$CH_2CH_2CH_3$	H
SH	CH_3	H	2	$CH_2CH_2CH_3$	H
Cl	CH_3	H	2	$CH_2CH_2CH_3$	H
SH	Cl	H	2	$CH_2CH_2CH_3$	H
Cl	Cl	H	2	$CH_2CH_2CH_3$	H
SH	CH_3	CH_3	2	$CH_2CH_2CH_3$	H
Cl	CH_3	CH_3	2	$CH_2CH_2CH_3$	H
SH	Cl	Cl	2	$CH_2CH_2CH_3$	H
Cl	Cl	Cl	2	$CH_2CH_2CH_3$	H
SH	H	H	1	H	CH_3
Cl	H	H	1	H	CH_3
SH	CH_3	H	1	H	CH_3
Cl	CH_3	H	1	H	CH_3
SH	Cl	H	1	H	CH_3
Cl	Cl	H	1	H	CH_3
SH	CH_3	CH_3	1	H	CH_3
Cl	CH_3	CH_3	1	H	CH_3
SH	Cl	Cl	1	H	CH_3
Cl	Cl	Cl	1	H	CH_3
SH	H	H	2	H	CH_3
Cl	H	H	2	H	CH_3
SH	CH_3	H	2	H	CH_3
Cl	CH_3	H	2	H	CH_3
SH	Cl	H	2	H	CH_3
Cl	Cl	H	2	H	CH_3
SH	CH_3	CH_3	2	H	CH_3
Cl	CH_3	CH_3	2	H	CH_3
SH	Cl	Cl	2	H	CH_3

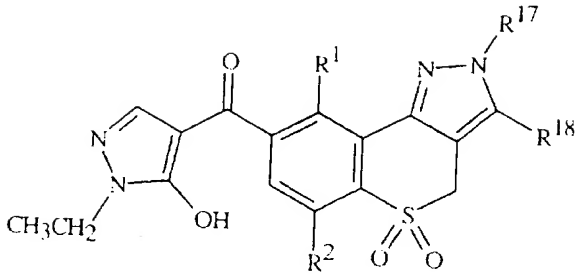
Cl	Cl	Cl	2	H	CH_3
SH	H	H	1	CH_3	CH_3
Cl	H	H	1	CH_3	CH_3
SH	CH_3	H	1	CH_3	CH_3
Cl	CH_3	H	1	CH_3	CH_3
SH	Cl	H	1	CH_3	CH_3
Cl	Cl	H	1	CH_3	CH_3
SH	CH_3	CH_3	1	CH_3	CH_3
Cl	CH_3	CH_3	1	CH_3	CH_3
SH	Cl	Cl	1	CH_3	CH_3
Cl	Cl	Cl	1	CH_3	CH_3
SH	H	H	2	CH_3	CH_3
Cl	H	H	2	CH_3	CH_3
SH	CH_3	H	2	CH_3	CH_3
Cl	CH_3	H	2	CH_3	CH_3
SH	Cl	H	2	CH_3	CH_3
Cl	Cl	H	2	CH_3	CH_3
SH	CH_3	CH_3	2	CH_3	CH_3
Cl	CH_3	CH_3	2	CH_3	CH_3
SH	Cl	Cl	2	CH_3	CH_3
Cl	Cl	Cl	2	CH_3	CH_3
SH	H	H	1	CH_2CH_3	CH_3
Cl	H	H	1	CH_2CH_3	CH_3
SH	CH_3	H	1	CH_2CH_3	CH_3
Cl	CH_3	H	1	CH_2CH_3	CH_3
SH	Cl	H	1	CH_2CH_3	CH_3
Cl	Cl	H	1	CH_2CH_3	CH_3
SH	CH_3	CH_3	1	CH_2CH_3	CH_3
Cl	CH_3	CH_3	1	CH_2CH_3	CH_3
SH	Cl	Cl	1	CH_2CH_3	CH_3
Cl	Cl	Cl	1	CH_2CH_3	CH_3
SH	H	H	2	CH_2CH_3	CH_3
Cl	H	H	2	CH_2CH_3	CH_3
SH	CH_3	H	2	CH_2CH_3	CH_3
Cl	CH_3	H	2	CH_2CH_3	CH_3
SH	Cl	H	2	CH_2CH_3	CH_3
Cl	Cl	H	2	CH_2CH_3	CH_3
SH	CH_3	CH_3	2	CH_2CH_3	CH_3

Cl	CH_3	CH_3	2	CH_2CH_3	CH_3
SH	Cl	Cl	2	CH_2CH_3	CH_3
Cl	Cl	Cl	2	CH_2CH_3	CH_3
SH	H	H	1	$CH_2CH_2CH_3$	CH_3
Cl	H	H	1	$CH_2CH_2CH_3$	CH_3
SH	CH_3	H	1	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	H	1	$CH_2CH_2CH_3$	CH_3
SH	Cl	H	1	$CH_2CH_2CH_3$	CH_3
Cl	Cl	H	1	$CH_2CH_2CH_3$	CH_3
SH	CH_3	CH_3	1	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	CH_3	1	$CH_2CH_2CH_3$	CH_3
SH	Cl	Cl	1	$CH_2CH_2CH_3$	CH_3
Cl	Cl	Cl	1	$CH_2CH_2CH_3$	CH_3
SH	H	H	2	$CH_2CH_2CH_3$	CH_3
Cl	H	H	2	$CH_2CH_2CH_3$	CH_3
SH	CH_3	H	2	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	H	2	$CH_2CH_2CH_3$	CH_3
SH	Cl	H	2	$CH_2CH_2CH_3$	CH_3
Cl	Cl	H	2	$CH_2CH_2CH_3$	CH_3
SH	CH_3	CH_3	2	$CH_2CH_2CH_3$	CH_3
Cl	CH_3	CH_3	2	$CH_2CH_2CH_3$	CH_3
SH	Cl	Cl	2	$CH_2CH_2CH_3$	CH_3
Cl	Cl	Cl	2	$CH_2CH_2CH_3$	CH_3
SH	H	H	1	H	Cl
Cl	H	H	1	H	Cl
SH	CH_3	H	1	H	Cl
Cl	CH_3	H	1	H	Cl
SH	Cl	H	1	H	Cl
Cl	Cl	H	1	H	Cl
SH	CH_3	CH_3	1	H	Cl
Cl	CH_3	CH_3	1	H	Cl
SH	Cl	Cl	1	H	Cl
Cl	Cl	Cl	1	H	Cl
SH	H	H	2	H	Cl
Cl	H	H	2	H	Cl
SH	CH_3	H	2	H	Cl
Cl	CH_3	H	2	H	Cl
SH	Cl	H	2	H	Cl

Cl	Cl	H	2	H	Cl
SH	CH_3	CH_3	2	H	Cl
Cl	CH_3	CH_3	2	H	Cl
SH	Cl	Cl	2	H	Cl
Cl	Cl	Cl	2	H	Cl
SH	H	H	1	CH_3	Cl
Cl	H	H	1	CH_3	Cl
SH	CH_3	H	1	CH_3	Cl
Cl	CH_3	H	1	CH_3	Cl
SH	Cl	H	1	CH_3	Cl
Cl	Cl	H	1	CH_3	Cl
SH	CH_3	CH_3	1	CH_3	Cl
Cl	CH_3	CH_3	1	CH_3	Cl
SH	Cl	Cl	1	CH_3	Cl
Cl	Cl	Cl	1	CH_3	Cl
SH	H	H	2	CH_3	Cl
Cl	H	H	2	CH_3	Cl
SH	CH_3	H	2	CH_3	Cl
Cl	CH_3	H	2	CH_3	Cl
SH	Cl	H	2	CH_3	Cl
Cl	Cl	H	2	CH_3	Cl
SH	CH_3	CH_3	2	CH_3	Cl
Cl	CH_3	CH_3	2	CH_3	Cl
SH	Cl	Cl	2	CH_3	Cl
Cl	Cl	Cl	2	CH_3	Cl
SH	H	H	1	CH_2CH_3	Cl
Cl	H	H	1	CH_2CH_3	Cl
SH	CH_3	H	1	CH_2CH_3	Cl
Cl	CH_3	H	1	CH_2CH_3	Cl
SH	Cl	H	1	CH_2CH_3	Cl
Cl	Cl	H	1	CH_2CH_3	Cl
SH	CH_3	CH_3	1	CH_2CH_3	Cl
Cl	CH_3	CH_3	1	CH_2CH_3	Cl
SH	Cl	Cl	1	CH_2CH_3	Cl
Cl	Cl	Cl	1	CH_2CH_3	Cl
SH	H	H	2	CH_2CH_3	Cl
Cl	H	H	2	CH_2CH_3	Cl
SH	CH_3	H	2	CH_2CH_3	Cl

Cl	CH_3	H	2	CH_2CH_3	Cl
SH	Cl	H	2	CH_2CH_3	Cl
Cl	Cl	H	2	CH_2CH_3	Cl
SH	CH_3	CH_3	2	CH_2CH_3	Cl
Cl	CH_3	CH_3	2	CH_2CH_3	Cl
SH	Cl	Cl	2	CH_2CH_3	Cl
Cl	Cl	Cl	2	CH_2CH_3	Cl
SH	H	H	1	$CH_2CH_2CH_3$	Cl
Cl	H	H	1	$CH_2CH_2CH_3$	Cl
SH	CH_3	H	1	$CH_2CH_2CH_3$	Cl
Cl	CH_3	H	1	$CH_2CH_2CH_3$	Cl
SH	Cl	H	1	$CH_2CH_2CH_3$	Cl
Cl	Cl	H	1	$CH_2CH_2CH_3$	Cl
SH	CH_3	CH_3	1	$CH_2CH_2CH_3$	Cl
Cl	CH_3	CH_3	1	$CH_2CH_2CH_3$	Cl
SH	Cl	Cl	1	$CH_2CH_2CH_3$	Cl
Cl	Cl	Cl	1	$CH_2CH_2CH_3$	Cl
SH	H	H	2	$CH_2CH_2CH_3$	Cl
Cl	H	H	2	$CH_2CH_2CH_3$	Cl
SH	CH_3	H	2	$CH_2CH_2CH_3$	Cl
Cl	CH_3	H	2	$CH_2CH_2CH_3$	Cl
SH	Cl	H	2	$CH_2CH_2CH_3$	Cl
Cl	Cl	H	2	$CH_2CH_2CH_3$	Cl
SH	CH_3	CH_3	2	$CH_2CH_2CH_3$	Cl
Cl	CH_3	CH_3	2	$CH_2CH_2CH_3$	Cl
SH	Cl	Cl	2	$CH_2CH_2CH_3$	Cl
Cl	Cl	Cl	2	$CH_2CH_2CH_3$	Cl

Table 17



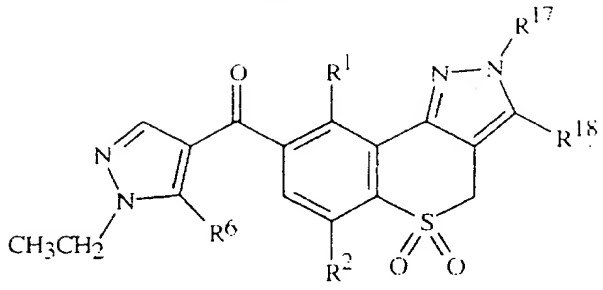
R^1	R^2	R^{17}	R^{18}
H	H	$CH(CH_3)_2$	H
CH_3	H	$CH(CH_3)_2$	H
Cl	H	$CH(CH_3)_2$	H
CH_3	CH_3	$CH(CH_3)_2$	H
Cl	Cl	$CH(CH_3)_2$	H
H	H	phenyl	H
CH_3	H	phenyl	H
Cl	H	phenyl	H
CH_3	CH_3	phenyl	H
Cl	Cl	phenyl	H
H	H	(4-CH_3)Ph	H
CH_3	H	(4-CH_3)Ph	H
Cl	H	(4-CH_3)Ph	H
CH_3	CH_3	(4-CH_3)Ph	H
Cl	Cl	(4-CH_3)Ph	H
H	H	(4-Cl)Ph	H
CH_3	H	(4-Cl)Ph	H
Cl	H	(4-Cl)Ph	H
CH_3	CH_3	(4-Cl)Ph	H
Cl	Cl	(4-Cl)Ph	H
H	H	(4-NO_2)Ph	H
CH_3	H	(4-NO_2)Ph	H
Cl	H	(4-NO_2)Ph	H
CH_3	CH_3	(4-NO_2)Ph	H
Cl	Cl	(4-NO_2)Ph	H
H	H	(4-CN)Ph	H
CH_3	H	(4-CN)Ph	H
Cl	H	(4-CN)Ph	H

CH_3	CH_3	(4-CN)Ph	H
Cl	Cl	(4-CN)Ph	H
H	H	2-pyridyl	H
CH_3	H	2-pyridyl	H
Cl	H	2-pyridyl	H
CH_3	CH_3	2-pyridyl	H
Cl	Cl	2-pyridyl	H
H	H	4-pyridyl	H
CH_3	H	4-pyridyl	H
Cl	H	4-pyridyl	H
CH_3	CH_3	4-pyridyl	H
Cl	Cl	4-pyridyl	H
H	H	CH_2CF_3	H
CH_3	H	CH_2CF_3	H
Cl	H	CH_2CF_3	H
CH_3	CH_3	CH_2CF_3	H
Cl	Cl	CH_2CF_3	H
H	H	$CH(CH_3)_2$	Cl
CH_3	H	$CH(CH_3)_2$	Cl
Cl	H	$CH(CH_3)_2$	Cl
CH_3	CH_3	$CH(CH_3)_2$	Cl
Cl	Cl	$CH(CH_3)_2$	Cl
H	H	phenyl	Cl
CH_3	H	phenyl	Cl
Cl	H	phenyl	Cl
CH_3	CH_3	phenyl	Cl
Cl	Cl	phenyl	Cl
H	H	(4-CH_3)Ph	Cl
CH_3	H	(4-CH_3)Ph	Cl
Cl	H	(4-CH_3)Ph	Cl
CH_3	CH_3	(4-CH_3)Ph	Cl
Cl	Cl	(4-CH_3)Ph	Cl
H	H	(4-Cl)Ph	Cl
CH_3	H	(4-Cl)Ph	Cl
Cl	H	(4-Cl)Ph	Cl
CH_3	CH_3	(4-Cl)Ph	Cl
Cl	Cl	(4-Cl)Ph	Cl
H	H	(4-NO_2)Ph	Cl

CH_3	H	(4-NO_2)Ph	Cl
Cl	H	(4-NO_2)Ph	Cl
CH_3	CH_3	(4-NO_2)Ph	Cl
Cl	Cl	(4-NO_2)Ph	Cl
H	H	(4-CN)Ph	Cl
CH_3	H	(4-CN)Ph	Cl
Cl	H	(4-CN)Ph	Cl
CH_3	CH_3	(4-CN)Ph	Cl
Cl	Cl	(4-CN)Ph	Cl
H	H	2-pyridyl	Cl
CH_3	H	2-pyridyl	Cl
Cl	H	2-pyridyl	Cl
CH_3	CH_3	2-pyridyl	Cl
Cl	Cl	2-pyridyl	Cl
H	H	4-pyridyl	Cl
CH_3	H	4-pyridyl	Cl
Cl	H	4-pyridyl	Cl
CH_3	CH_3	4-pyridyl	Cl
Cl	Cl	4-pyridyl	Cl
H	H	CH_2CF_3	Cl
CH_3	H	CH_2CF_3	Cl
Cl	H	CH_2CF_3	Cl
CH_3	CH_3	CH_2CF_3	Cl
Cl	Cl	CH_2CF_3	Cl
H	H	$CH(CH_3)_2$	CH_3
CH_3	H	$CH(CH_3)_2$	CH_3
Cl	H	$CH(CH_3)_2$	CH_3
CH_3	CH_3	$CH(CH_3)_2$	CH_3
Cl	Cl	$CH(CH_3)_2$	CH_3
H	H	phenyl	CH_3
CH_3	H	phenyl	CH_3
Cl	H	phenyl	CH_3
CH_3	CH_3	phenyl	CH_3
Cl	Cl	phenyl	CH_3
H	H	(4-CH_3)Ph	CH_3
CH_3	H	(4-CH_3)Ph	CH_3
Cl	H	(4-CH_3)Ph	CH_3
CH_3	CH_3	(4-CH_3)Ph	CH_3

Cl	Cl	(4-CH_3)Ph	CH_3
H	H	(4-Cl)Ph	CH_3
CH_3	H	(4-Cl)Ph	CH_3
Cl	H	(4-Cl)Ph	CH_3
CH_3	CH_3	(4-Cl)Ph	CH_3
Cl	Cl	(4-Cl)Ph	CH_3
H	H	(4-NO_2)Ph	CH_3
CH_3	H	(4-NO_2)Ph	CH_3
Cl	H	(4-NO_2)Ph	CH_3
CH_3	CH_3	(4-NO_2)Ph	CH_3
Cl	Cl	(4-NO_2)Ph	CH_3
H	H	(4-CN)Ph	CH_3
CH_3	H	(4-CN)Ph	CH_3
Cl	H	(4-CN)Ph	CH_3
CH_3	CH_3	(4-CN)Ph	CH_3
Cl	Cl	(4-CN)Ph	CH_3
H	H	2-pyridyl	CH_3
CH_3	H	2-pyridyl	CH_3
Cl	H	2-pyridyl	CH_3
CH_3	CH_3	2-pyridyl	CH_3
Cl	Cl	2-pyridyl	CH_3
H	H	4-pyridyl	CH_3
CH_3	H	4-pyridyl	CH_3
Cl	H	4-pyridyl	CH_3
CH_3	CH_3	4-pyridyl	CH_3
Cl	Cl	4-pyridyl	CH_3
H	H	CH_2CF_3	CH_3
CH_3	H	CH_2CF_3	CH_3
Cl	H	CH_2CF_3	CH_3
CH_3	CH_3	CH_2CF_3	CH_3
Cl	Cl	CH_2CF_3	CH_3

Table 18



R^6	R^1	R^2	R^{17}	R^{18}
OH	CH_2CH_3	H	H	H
SH	CH_2CH_3	H	H	H
Cl	CH_2CH_3	H	H	H
OH	NO_2	H	H	H
SH	NO_2	H	H	H
Cl	NO_2	H	H	H
OH	OCH_3	H	H	H
SH	OCH_3	H	H	H
Cl	OCH_3	H	H	H
OH	CH_2CH_3	CH_3	H	H
SH	CH_2CH_3	CH_3	H	H
Cl	CH_2CH_3	CH_3	H	H
OH	NO_2	CH_3	H	H
SH	NO_2	CH_3	H	H
Cl	NO_2	CH_3	H	H
OH	OCH_3	CH_3	H	H
SH	OCH_3	CH_3	H	H
Cl	OCH_3	CH_3	H	H
OH	CH_2CH_3	Cl	H	H
SH	CH_2CH_3	Cl	H	H
Cl	CH_2CH_3	Cl	H	H
OH	NO_2	Cl	H	H
SH	NO_2	Cl	H	H
Cl	NO_2	Cl	H	H
OH	OCH_3	Cl	H	H
SH	OCH_3	Cl	H	H
Cl	OCH_3	Cl	H	H
OH	CH_2CH_3	H	CH_3	H

SH	CH_2CH_3	H	CH_3	H
Cl	CH_2CH_3	H	CH_3	H
OH	NO_2	H	CH_3	H
SH	NO_2	H	CH_3	H
Cl	NO_2	H	CH_3	H
OH	OCH_3	H	CH_3	H
SH	OCH_3	H	CH_3	H
Cl	OCH_3	H	CH_3	H
OH	CH_2CH_3	CH_3	CH_3	H
SH	CH_2CH_3	CH_3	CH_3	H
Cl	CH_2CH_3	CH_3	CH_3	H
OH	NO_2	CH_3	CH_3	H
SH	NO_2	CH_3	CH_3	H
Cl	NO_2	CH_3	CH_3	H
OH	OCH_3	CH_3	CH_3	H
SH	OCH_3	CH_3	CH_3	H
Cl	OCH_3	CH_3	CH_3	H
OH	CH_2CH_3	Cl	CH_3	H
SH	CH_2CH_3	Cl	CH_3	H
Cl	CH_2CH_3	Cl	CH_3	H
OH	NO_2	Cl	CH_3	H
SH	NO_2	Cl	CH_3	H
Cl	NO_2	Cl	CH_3	H
OH	OCH_3	Cl	CH_3	H
SH	OCH_3	Cl	CH_3	H
Cl	OCH_3	Cl	CH_3	H
OH	CH_2CH_3	H	CH_2CH_3	H
SH	CH_2CH_3	H	CH_2CH_3	H
Cl	CH_2CH_3	H	CH_2CH_3	H
OH	NO_2	H	CH_2CH_3	H
SH	NO_2	H	CH_2CH_3	H
Cl	NO_2	H	CH_2CH_3	H
OH	OCH_3	H	CH_2CH_3	H
SH	OCH_3	H	CH_2CH_3	H
Cl	OCH_3	H	CH_2CH_3	H
OH	CH_2CH_3	CH_3	CH_2CH_3	H
SH	CH_2CH_3	CH_3	CH_2CH_3	H
Cl	CH_2CH_3	CH_3	CH_2CH_3	H

OH	NO_2	CH_3	CH_2CH_3	H
SH	NO_2	CH_3	CH_2CH_3	H
Cl	NO_2	CH_3	CH_2CH_3	H
OH	OCH_3	CH_3	CH_2CH_3	H
SH	OCH_3	CH_3	CH_2CH_3	H
Cl	OCH_3	CH_3	CH_2CH_3	H
OH	CH_2CH_3	Cl	CH_2CH_3	H
SH	CH_2CH_3	Cl	CH_2CH_3	H
Cl	CH_2CH_3	Cl	CH_2CH_3	H
OH	NO_2	Cl	CH_2CH_3	H
SH	NO_2	Cl	CH_2CH_3	H
Cl	NO_2	Cl	CH_2CH_3	H
OH	OCH_3	Cl	CH_2CH_3	H
SH	OCH_3	Cl	CH_2CH_3	H
Cl	OCH_3	Cl	CH_2CH_3	H
OH	CH_2CH_3	H	$CH_2CH_2CH_3$	H
SH	CH_2CH_3	H	$CH_2CH_2CH_3$	H
Cl	CH_2CH_3	H	$CH_2CH_2CH_3$	H
OH	NO_2	H	$CH_2CH_2CH_3$	H
SH	NO_2	H	$CH_2CH_2CH_3$	H
Cl	NO_2	H	$CH_2CH_2CH_3$	H
OH	OCH_3	H	$CH_2CH_2CH_3$	H
SH	OCH_3	H	$CH_2CH_2CH_3$	H
Cl	OCH_3	H	$CH_2CH_2CH_3$	H
OH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	H
SH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	H
Cl	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	H
OH	NO_2	CH_3	$CH_2CH_2CH_3$	H
SH	NO_2	CH_3	$CH_2CH_2CH_3$	H
Cl	NO_2	CH_3	$CH_2CH_2CH_3$	H
OH	OCH_3	CH_3	$CH_2CH_2CH_3$	H
SH	OCH_3	CH_3	$CH_2CH_2CH_3$	H
Cl	OCH_3	CH_3	$CH_2CH_2CH_3$	H
OH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	H
SH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	H
Cl	CH_2CH_3	Cl	$CH_2CH_2CH_3$	H
OH	NO_2	Cl	$CH_2CH_2CH_3$	H
SH	NO_2	Cl	$CH_2CH_2CH_3$	H

Cl	NO_2	Cl	$CH_2CH_2CH_3$	H
OH	OCH_3	Cl	$CH_2CH_2CH_3$	H
SH	OCH_3	Cl	$CH_2CH_2CH_3$	H
Cl	OCH_3	Cl	$CH_2CH_2CH_3$	H
OH	CH_2CH_3	H	H	CH_3
SH	CH_2CH_3	H	H	CH_3
Cl	CH_2CH_3	H	H	CH_3
OH	NO_2	H	H	CH_3
SH	NO_2	H	H	CH_3
Cl	NO_2	H	H	CH_3
OH	OCH_3	H	H	CH_3
SH	OCH_3	H	H	CH_3
Cl	OCH_3	H	H	CH_3
OH	CH_2CH_3	CH_3	H	CH_3
SH	CH_2CH_3	CH_3	H	CH_3
Cl	CH_2CH_3	CH_3	H	CH_3
OH	NO_2	CH_3	H	CH_3
SH	NO_2	CH_3	H	CH_3
Cl	NO_2	CH_3	H	CH_3
OH	OCH_3	CH_3	H	CH_3
SH	OCH_3	CH_3	H	CH_3
Cl	OCH_3	CH_3	H	CH_3
OH	CH_2CH_3	Cl	H	CH_3
SH	CH_2CH_3	Cl	H	CH_3
Cl	CH_2CH_3	Cl	H	CH_3
OH	NO_2	Cl	H	CH_3
SH	NO_2	Cl	H	CH_3
Cl	NO_2	Cl	H	CH_3
OH	OCH_3	Cl	H	CH_3
SH	OCH_3	Cl	H	CH_3
Cl	OCH_3	Cl	H	CH_3
OH	CH_2CH_3	H	CH_3	CH_3
SH	CH_2CH_3	H	CH_3	CH_3
Cl	CH_2CH_3	H	CH_3	CH_3
OH	NO_2	H	CH_3	CH_3
SH	NO_2	H	CH_3	CH_3
Cl	NO_2	H	CH_3	CH_3
OH	OCH_3	H	CH_3	CH_3

SH	OCH_3	H	CH_3	CH_3
Cl	OCH_3	H	CH_3	CH_3
OH	CH_2CH_3	CH_3	CH_3	CH_3
SH	CH_2CH_3	CH_3	CH_3	CH_3
Cl	CH_2CH_3	CH_3	CH_3	CH_3
OH	NO_2	CH_3	CH_3	CH_3
SH	NO_2	CH_3	CH_3	CH_3
Cl	NO_2	CH_3	CH_3	CH_3
OH	OCH_3	CH_3	CH_3	CH_3
SH	OCH_3	CH_3	CH_3	CH_3
Cl	OCH_3	CH_3	CH_3	CH_3
OH	CH_2CH_3	Cl	CH_3	CH_3
SH	CH_2CH_3	Cl	CH_3	CH_3
Cl	CH_2CH_3	Cl	CH_3	CH_3
OH	NO_2	Cl	CH_3	CH_3
SH	NO_2	Cl	CH_3	CH_3
Cl	NO_2	Cl	CH_3	CH_3
OH	OCH_3	Cl	CH_3	CH_3
SH	OCH_3	Cl	CH_3	CH_3
Cl	OCH_3	Cl	CH_3	CH_3
OH	CH_2CH_3	H	CH_2CH_3	CH_3
SH	CH_2CH_3	H	CH_2CH_3	CH_3
Cl	CH_2CH_3	H	CH_2CH_3	CH_3
OH	NO_2	H	CH_2CH_3	CH_3
SH	NO_2	H	CH_2CH_3	CH_3
Cl	NO_2	H	CH_2CH_3	CH_3
OH	OCH_3	H	CH_2CH_3	CH_3
SH	OCH_3	H	CH_2CH_3	CH_3
Cl	OCH_3	H	CH_2CH_3	CH_3
OH	CH_2CH_3	CH_3	CH_2CH_3	CH_3
SH	CH_2CH_3	CH_3	CH_2CH_3	CH_3
Cl	CH_2CH_3	CH_3	CH_2CH_3	CH_3
OH	NO_2	CH_3	CH_2CH_3	CH_3
SH	NO_2	CH_3	CH_2CH_3	CH_3
Cl	NO_2	CH_3	CH_2CH_3	CH_3
OH	OCH_3	CH_3	CH_2CH_3	CH_3
SH	OCH_3	CH_3	CH_2CH_3	CH_3
Cl	OCH_3	CH_3	CH_2CH_3	CH_3

OH	CH_2CH_3	Cl	CH_2CH_3	CH_3
SH	CH_2CH_3	Cl	CH_2CH_3	CH_3
Cl	CH_2CH_3	Cl	CH_2CH_3	CH_3
OH	NO_2	Cl	CH_2CH_3	CH_3
SH	NO_2	Cl	CH_2CH_3	CH_3
Cl	NO_2	Cl	CH_2CH_3	CH_3
OH	OCH_3	Cl	CH_2CH_3	CH_3
SH	OCH_3	Cl	CH_2CH_3	CH_3
Cl	OCH_3	Cl	CH_2CH_3	CH_3
OH	CH_2CH_3	H	$CH_2CH_2CH_3$	CH_3
SH	CH_2CH_3	H	$CH_2CH_2CH_3$	CH_3
Cl	CH_2CH_3	H	$CH_2CH_2CH_3$	CH_3
OH	NO_2	H	$CH_2CH_2CH_3$	CH_3
SH	NO_2	H	$CH_2CH_2CH_3$	CH_3
Cl	NO_2	H	$CH_2CH_2CH_3$	CH_3
OH	OCH_3	H	$CH_2CH_2CH_3$	CH_3
SH	OCH_3	H	$CH_2CH_2CH_3$	CH_3
Cl	OCH_3	H	$CH_2CH_2CH_3$	CH_3
OH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	CH_3
SH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	CH_3
Cl	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	CH_3
OH	NO_2	CH_3	$CH_2CH_2CH_3$	CH_3
SH	NO_2	CH_3	$CH_2CH_2CH_3$	CH_3
Cl	NO_2	CH_3	$CH_2CH_2CH_3$	CH_3
OH	OCH_3	CH_3	$CH_2CH_2CH_3$	CH_3
SH	OCH_3	CH_3	$CH_2CH_2CH_3$	CH_3
Cl	OCH_3	CH_3	$CH_2CH_2CH_3$	CH_3
OH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	CH_3
SH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	CH_3
Cl	CH_2CH_3	Cl	$CH_2CH_2CH_3$	CH_3
OH	NO_2	Cl	$CH_2CH_2CH_3$	CH_3
SH	NO_2	Cl	$CH_2CH_2CH_3$	CH_3
Cl	NO_2	Cl	$CH_2CH_2CH_3$	CH_3
OH	OCH_3	Cl	$CH_2CH_2CH_3$	CH_3
SH	OCH_3	Cl	$CH_2CH_2CH_3$	CH_3
Cl	OCH_3	Cl	$CH_2CH_2CH_3$	CH_3
OH	CH_2CH_3	H	H	Cl
SH	CH_2CH_3	H	H	Cl

Cl	CH_2CH_3	H	H	Cl
OH	NO_2	H	H	Cl
SH	NO_2	H	H	Cl
Cl	NO_2	H	H	Cl
OH	OCH_3	H	H	Cl
SH	OCH_3	H	H	Cl
Cl	OCH_3	H	H	Cl
OH	CH_2CH_3	CH_3	H	Cl
SH	CH_2CH_3	CH_3	H	Cl
Cl	CH_2CH_3	CH_3	H	Cl
OH	NO_2	CH_3	H	Cl
SH	NO_2	CH_3	H	Cl
Cl	NO_2	CH_3	H	Cl
OH	OCH_3	CH_3	H	Cl
SH	OCH_3	CH_3	H	Cl
Cl	OCH_3	CH_3	H	Cl
OH	CH_2CH_3	Cl	H	Cl
SH	CH_2CH_3	Cl	H	Cl
Cl	CH_2CH_3	Cl	H	Cl
OH	NO_2	Cl	H	Cl
SH	NO_2	Cl	H	Cl
Cl	NO_2	Cl	H	Cl
OH	OCH_3	Cl	H	Cl
SH	OCH_3	Cl	H	Cl
Cl	OCH_3	Cl	H	Cl
OH	CH_2CH_3	H	CH_3	Cl
SH	CH_2CH_3	H	CH_3	Cl
Cl	CH_2CH_3	H	CH_3	Cl
OH	NO_2	H	CH_3	Cl
SH	NO_2	H	CH_3	Cl
Cl	NO_2	H	CH_3	Cl
OH	OCH_3	H	CH_3	Cl
SH	OCH_3	H	CH_3	Cl
Cl	OCH_3	H	CH_3	Cl
OH	CH_2CH_3	CH_3	CH_3	Cl
SH	CH_2CH_3	CH_3	CH_3	Cl
Cl	CH_2CH_3	CH_3	CH_3	Cl
OH	NO_2	CH_3	CH_3	Cl

SH	NO_2	CH_3	CH_3	Cl
Cl	NO_2	CH_3	CH_3	Cl
OH	OCH_3	CH_3	CH_3	Cl
SH	OCH_3	CH_3	CH_3	Cl
Cl	OCH_3	CH_3	CH_3	Cl
OH	CH_2CH_3	Cl	CH_3	Cl
SH	CH_2CH_3	Cl	CH_3	Cl
Cl	CH_2CH_3	Cl	CH_3	Cl
OH	NO_2	Cl	CH_3	Cl
SH	NO_2	Cl	CH_3	Cl
Cl	NO_2	Cl	CH_3	Cl
OH	OCH_3	Cl	CH_3	Cl
SH	OCH_3	Cl	CH_3	Cl
Cl	OCH_3	Cl	CH_3	Cl
OH	CH_2CH_3	H	CH_2CH_3	Cl
SH	CH_2CH_3	H	CH_2CH_3	Cl
Cl	CH_2CH_3	H	CH_2CH_3	Cl
OH	NO_2	H	CH_2CH_3	Cl
SH	NO_2	H	CH_2CH_3	Cl
Cl	NO_2	H	CH_2CH_3	Cl
OH	OCH_3	H	CH_2CH_3	Cl
SH	OCH_3	H	CH_2CH_3	Cl
Cl	OCH_3	H	CH_2CH_3	Cl
OH	CH_2CH_3	CH_3	CH_2CH_3	Cl
SH	CH_2CH_3	CH_3	CH_2CH_3	Cl
Cl	CH_2CH_3	CH_3	CH_2CH_3	Cl
OH	NO_2	CH_3	CH_2CH_3	Cl
SH	NO_2	CH_3	CH_2CH_3	Cl
Cl	NO_2	CH_3	CH_2CH_3	Cl
OH	OCH_3	CH_3	CH_2CH_3	Cl
SH	OCH_3	CH_3	CH_2CH_3	Cl
Cl	OCH_3	CH_3	CH_2CH_3	Cl
OH	CH_2CH_3	Cl	CH_2CH_3	Cl
SH	CH_2CH_3	Cl	CH_2CH_3	Cl
Cl	CH_2CH_3	Cl	CH_2CH_3	Cl
OH	NO_2	Cl	CH_2CH_3	Cl
SH	NO_2	Cl	CH_2CH_3	Cl
Cl	NO_2	Cl	CH_2CH_3	Cl

OH	OCH_3	Cl	CH_2CH_3	Cl
SH	OCH_3	Cl	CH_2CH_3	Cl
Cl	OCH_3	Cl	CH_2CH_3	Cl
OH	CH_2CH_3	H	$CH_2CH_2CH_3$	Cl
SH	CH_2CH_3	H	$CH_2CH_2CH_3$	Cl
Cl	CH_2CH_3	H	$CH_2CH_2CH_3$	Cl
OH	NO_2	H	$CH_2CH_2CH_3$	Cl
SH	NO_2	H	$CH_2CH_2CH_3$	Cl
Cl	NO_2	H	$CH_2CH_2CH_3$	Cl
OH	OCH_3	H	$CH_2CH_2CH_3$	Cl
SH	OCH_3	H	$CH_2CH_2CH_3$	Cl
Cl	OCH_3	H	$CH_2CH_2CH_3$	Cl
OH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	Cl
SH	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	Cl
Cl	CH_2CH_3	CH_3	$CH_2CH_2CH_3$	Cl
OH	NO_2	CH_3	$CH_2CH_2CH_3$	Cl
SH	NO_2	CH_3	$CH_2CH_2CH_3$	Cl
Cl	NO_2	CH_3	$CH_2CH_2CH_3$	Cl
OH	OCH_3	CH_3	$CH_2CH_2CH_3$	Cl
SH	OCH_3	CH_3	$CH_2CH_2CH_3$	Cl
Cl	OCH_3	CH_3	$CH_2CH_2CH_3$	Cl
OH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	Cl
SH	CH_2CH_3	Cl	$CH_2CH_2CH_3$	Cl
Cl	CH_2CH_3	Cl	$CH_2CH_2CH_3$	Cl
OH	NO_2	Cl	$CH_2CH_2CH_3$	Cl
SH	NO_2	Cl	$CH_2CH_2CH_3$	Cl
Cl	NO_2	Cl	$CH_2CH_2CH_3$	Cl
OH	OCH_3	Cl	$CH_2CH_2CH_3$	Cl
SH	OCH_3	Cl	$CH_2CH_2CH_3$	Cl
Cl	OCH_3	Cl	$CH_2CH_2CH_3$	Cl

Formulation/Utility

Compounds of this invention will generally be used as a formulation or composition with an agriculturally suitable carrier comprising at least one of a liquid diluent, a solid diluent or a surfactant. The formulation or composition ingredients are selected to be consistent with the physical properties of the active ingredient, mode of application and environmental factors such as soil type, moisture and temperature. Useful formulations include liquids such as solutions (including emulsifiable concentrates), suspensions, emulsions (including microemulsions and/or suspoemulsions) and the like which optionally can be thickened into gels. Useful formulations further include solids such as dusts, powders, granules, pellets, tablets, films, and the like which can be water-dispersible ("wettable") or water-soluble. Active ingredient can be (micro)encapsulated and further formed into a suspension or solid formulation; alternatively the entire formulation of active ingredient can be encapsulated (or "overcoated"). Encapsulation can control or delay release of the active ingredient. Sprayable formulations can be extended in suitable media and used at spray volumes from about one to several hundred liters per hectare. High-strength compositions are primarily used as intermediates for further formulation.

The formulations will typically contain effective amounts of active ingredient, diluent and surfactant within the following approximate ranges which add up to 100 percent by weight.

	Weight Percent		
	Active Ingredient	Diluent	Surfactant
Water-Dispersible and Water-soluble Granules, Tablets and Powders.	5–90	0–94	1–15
Suspensions, Emulsions, Solutions (including Emulsifiable Concentrates)	5–50	40–95	0–15
Dusts	1–25	70–99	0–5
Granules and Pellets	0.01–99	5–99.99	0–15
High Strength Compositions	90–99	0–10	0–2

Typical solid diluents are described in Watkins, et al., *Handbook of Insecticide Dust Diluents and Carriers*, 2nd Ed., Dorland Books, Caldwell, New Jersey. Typical liquid diluents are described in Marsden, *Solvents Guide*, 2nd Ed., Interscience, New York, 1950. *McCutcheon's Detergents and Emulsifiers Annual*, Allured Publ. Corp., Ridgewood, New Jersey, as well as Sisely and Wood, *Encyclopedia of Surface Active Agents*, Chemical Publ. Co., Inc., New York, 1964, list surfactants and recommended uses. All formulations can contain minor amounts of additives to reduce foam, caking, corrosion, microbiological growth and the like, or thickeners to increase viscosity.

Surfactants include, for example, polyethoxylated alcohols, polyethoxylated alkylphenols, polyethoxylated sorbitan fatty acid esters, dialkyl sulfosuccinates, alkyl sulfates, alkylbenzene sulfonates, organosilicones, *N,N*-dialkyltaurates, lignin sulfonates, naphthalene sulfonate formaldehyde condensates, polycarboxylates, and polyoxyethylene/polyoxypropylene block copolymers. Solid diluents include, for example, clays such as bentonite, montmorillonite, attapulgite and kaolin, starch, sugar, silica, talc, diatomaceous earth, urea, calcium carbonate, sodium carbonate and bicarbonate, and sodium sulfate. Liquid diluents include, for example, water, *N,N*-dimethylformamide, dimethyl sulfoxide, *N*-alkylpyrrolidone, ethylene glycol, polypropylene glycol, paraffins, alkylbenzenes, alkylnaphthalenes, oils of olive, castor, linseed, tung, sesame, corn, peanut, cotton-seed, soybean, rape-seed and coconut, fatty acid esters, ketones such as cyclohexanone, 2-heptanone, isophorone and 4-hydroxy-4-methyl-2-pentanone, and alcohols such as methanol, cyclohexanol, decanol and tetrahydrofurfuryl alcohol.

Solutions, including emulsifiable concentrates, can be prepared by simply mixing the ingredients. Dusts and powders can be prepared by blending and, usually, grinding as in a hammer mill or fluid-energy mill. Suspensions are usually prepared by wet-milling; see, for example, U.S. 3,060,084. Granules and pellets can be prepared by spraying the active material upon preformed granular carriers or by agglomeration techniques. See Browning, "Agglomeration", *Chemical Engineering*, December 4, 1967, pp 147-48, *Perry's Chemical Engineer's Handbook*, 4th Ed., McGraw-Hill, New York, 1963, pages 8-57 and following, and WO 91/13546. Pellets can be prepared as described in U.S. 4,172,714. Water-dispersible and water-soluble granules can be prepared as taught in U.S. 4,144,050, U.S. 3,920,442 and DE 3,246,493. Tablets can be prepared as taught in U.S. 5,180,587, U.S. 5,232,701 and U.S. 5,208,030. Films can be prepared as taught in GB 2,095,558 and U.S. 3,299,566.

For further information regarding the art of formulation, see U.S. 3,235,361, Col. 6, line 16 through Col. 7, line 19 and Examples 10-41; U.S. 3,309,192, Col. 5, line 43 through Col. 7, line 62 and Examples 8, 12, 15, 39, 41, 52, 53, 58, 132, 138-140, 162-164, 166, 167 and 169-182; U.S. 2,891,855, Col. 3, line 66 through Col. 5, line 17 and Examples 1-4; Klingman, *Weed Control as a Science*, John Wiley and Sons, Inc., New York, 1961, pp 81-96; and Hance et al., *Weed Control Handbook*, 8th Ed., Blackwell Scientific Publications, Oxford, 1989.

In the following Examples, all percentages are by weight and all formulations are prepared in conventional ways. Compound numbers refer to compounds in Index Tables A-C.

Example A

High Strength Concentrate

Compound 2	98.5%
silica aerogel	0.5%
synthetic amorphous fine silica	1.0%.

Example B

Wettable Powder

Compound 1	65.0%
dodecylphenol polyethylene glycol ether	2.0%
sodium ligninsulfonate	4.0%
sodium silicoaluminate	6.0%
montmorillonite (calcined)	23.0%.

Example C

Granule

Compound 15	10.0%
attapulgite granules (low volatile matter, 0.71/0.30 mm; U.S.S. No. 25–50 sieves)	90.0%.

Example D

Extruded Pellet

Compound 6	25.0%
anhydrous sodium sulfate	10.0%
crude calcium ligninsulfonate	5.0%
sodium alkylnaphthalenesulfonate	1.0%
calcium/magnesium bentonite	59.0%.

Test results indicate that the compounds of the present invention are highly active preemergent and postemergent herbicides or plant growth regulants. Many of them will have utility for broad-spectrum pre- and/or postemergence weed control in areas where complete control of all vegetation is desired such as around fuel storage tanks, industrial storage areas, parking lots, drive-in theaters, air fields, river banks, irrigation and other waterways, around billboards and highway and railroad structures. Some of the compounds will be useful for the control of selected grass and broadleaf weeds with tolerance to important agronomic crops which include but are not limited to barley, cotton, wheat, rape, sugar beets, corn (maize), soybeans, rice, tomato, potato, and plantation crops including coffee, cocoa, oil palm, rubber, sugarcane, citrus, grapes, fruit trees, nut trees, banana, plantain, pineapple, hops, tea, forests such as eucalyptus and conifers, e.g., loblolly pine, and turf species, e.g., Kentucky bluegrass, St. Augustine grass, Kentucky fescue and Bermuda grass. Those skilled in the art will appreciate that not all compounds are equally effective against all weeds. Alternatively, the subject compounds are useful to modify plant growth.

Compounds of this invention can be used alone or in combination with other commercial herbicides, insecticides or fungicides. Compounds of this invention can also be used in combination with commercial herbicide safeners such as benoxacor, dichlormid and furilazole to increase safety to certain crops. A mixture of one or more of the following herbicides with a compound of this invention may be particularly useful for weed control: acetochlor, acifluorfen and its sodium salt, aclonifen, acrolein (2-propenal), alachlor, ametryn, amidosulfuron, amitrole, ammonium sulfamate, anilofos, asulam, atrazine, azimsulfuron, benazolin, benazolin-ethyl, benfluralin, benfuresate, bensulfuron-methyl, bensulide, bentazone, bifenox, bromacil, bromoxynil, bromoxynil octanoate, butachlor, butralin, butylate, chlomethoxyfen, chloramben, chlorbromuron, chloridazon, chlorimuron-ethyl, chlornitrofen, chlorotoluron, chlorpropham, chlorsulfuron, chlorthal-dimethyl, cinmethylin, cinosulfuron, clethodim, clodinafop, clomazone, clopyralid, clopyralid-olamine, cyanazine, cycloate, cyclosulfamuron, 2,4-D and its butotyl, butyl, isoctyl and isopropyl esters and its dimethylammonium, diolamine and trolamine salts, daimuron, dalapon, dalapon-sodium, dazomet, 2,4-DB and its dimethylammonium, potassium and sodium salts, desmedipham, desmetryn, dicamba and its diglycolammonium, dimethylammonium, potassium and sodium salts, dichlobenil, dichlorprop, diclofop-methyl, 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid (AC 263,222), difenzoquat metilsulfate, diflufenican, dimepiperate, dimethenamid, dimethylarsinic acid and its sodium salt, dinitramine, diphenamid, diquat dibromide, dithiopyr, diuron, DNOC, endothal, EPTC, esprocarb, ethalfluralin, ethametsulfuron-methyl, ethofumesate, ethyl α,2-dichloro-5-[4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1*H*-1,2,4-triazol-1-yl]-4-fluorobenzenepropanoate (F8426), fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenuron, fenuron-TCA, flamprop-methyl, flamprop-M-isopropyl, flamprop-M-methyl, flazasulfuron, fluazifop-butyl, fluazifop-P-butyl, fluchloralin, flumetsulam, flumiclorac-pentyl, flumioxazin, fluometuron, fluoroglycofen-ethyl, flupoxam, fluridone, flurochloridone, fluroxypyr, fluthiacet-methyl, fomesafen, fosamine-ammonium, glufosinate, glufosinate-ammonium, glyphosate, glyphosate-isopropylammonium, glyphosate-sesquisodium, glyphosate-trimesium, halosulfuron-methyl, haloxyfop-etotyl, haloxyfop-methyl, hexazinone, imazamethabenz-methyl, imazamox (AC 299 263), imazapyr, imazaquin, imazaquin-ammonium, imazethapyr, imazethapyr-ammonium, imazosulfuron, ioxynil, ioxynil octanoate, ioxynil-sodium, isoproturon, isouron, isoxaben, isoxaflutole (RPA 201772), lactofen, lenacil, linuron, maleic hydrazide, MCPA and its dimethylammonium, potassium and sodium salts, MCPA-isoctyl, mecoprop, mecoprop-P, mefenacet, mefluidide, metam-sodium, methabenzthiazuron, methyl [[2-chloro-4-fluoro-5-[(tetrahydro-3-oxo-1*H*,3*H*-[1,3,4]thiadiazolo[3,4-*a*]pyridazin-1-ylidene)amino]phenyl]thioacetate (KIH 9201), methylarsonic acid and its

calcium, monoammonium, monosodium and disodium salts, methyl [[[1-[5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrophenyl]-2-methoxyethylidene]amino]oxy]acetate (AKH-7088), methyl 5-[[[[(4,6-dimethyl-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-1-(2-pyridinyl)-1*H*-pyrazole-4-carboxylate (NC-330), metobenzuron, metolachlor, metosulam, metoxuron, metribuzin, metsulfuron-methyl, molinate, monolinuron, napropamide, naptalam, neburon, nicosulfuron, norflurazon, oryzalin, oxadiazon, 3-oxetanyl 2-[[[[(4,6-dimethyl-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]benzoate (CGA 277476), oxyfluorfen, paraquat dichloride, pebulate, pendimethalin, perfluidone, phenmedipham, picloram, picloram-potassium, pretilachlor, primisulfuron-methyl, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propyzamide, prosulfuron, pyrazolynate, pyrazosulfuron-ethyl, pyridate, pyrithiobac, pyrithiobac-sodium, quinclorac, quizalofop-ethyl, quizalofop-P-ethyl, quizalofop-P-tefuryl, rimsulfuron, sethoxydim, siduron, simazine, sulcotrione (ICIA0051), sulfentrazone, sulfometuron-methyl, sulfosulfuron, TCA, TCA-sodium, tebuthiuron, terbacil, terbuthylazine, terbutryn, thenylchlor, thiafluamide (BAY 11390), thifensulfuron-methyl, thiobencarb, tralkoxydim, tri-allate, triasulfuron, tribenuron-methyl, triclopyr, triclopyr-butotyl, triclopyr-triethylammonium, tridiphane, trifluralin, triflusulfuron-methyl, and vernolate.

In certain instances, combinations with other herbicides having a similar spectrum of control but a different mode of action will be particularly advantageous for preventing the development of resistant weeds.

Certain combinations of compounds of this invention with other herbicides may provide synergistic herbicidal effects on weeds or may provide enhanced crop safety.

Preferred for better control of undesired vegetation in winter wheat, winter barley, spring wheat, spring barley, and peas (e.g., lower use rate, broader spectrum of weeds controlled, or enhanced crop safety) or for preventing the development of resistant weeds in winter wheat, winter barley, spring wheat, spring barley, and peas are mixtures of a compound of this invention with one or more of the herbicides selected from the group tribenuron-methyl, thifensulfuron-methyl, metsulfuron-methyl, chlorsulfuron, triasulfuron, 2,4-D, dicamba, bromoxynil, MCPA, fluroxypyr, clopyralid, fenoxaprop, diclofop, tralkoxydim, clodinafop, imazamethabenz, sulfosulfuron, difenzoquat, propanil, prosulfuron, metribuzin, glyphosate, triallate, trifluralin, paraquat, diallate, linuron, diflufenican, pendimethalin, cyanazine, neburon, terbutryn, prosulfocarb, isoproturon, chlortoluron, methabenzthiazuron, metoxuron, simazine, ioxynil, mecoprop, metosulam, fluroglycophen-ethyl, flamprop-M-isopropyl, benzoylpropethyl, ethametsulfuron-methyl, quinclorac, and bentazone.

Specifically preferred mixtures for use in winter wheat, winter barley, spring wheat, spring barley, and peas are selected from the group:

a) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	tribenuron-methyl	1:10-300:1	1:1-14:1	1-50	5-20
2	thifensulfuron-methyl	1:25-300:1	1:2-7:1	1-100	10-40
3	thifensulfuron-methyl in combination with tribenuron-methyl	1:10-300:1 1:5-300:1	1:1-7:1 2:1-14:1	1-50 1-20	10-20 5-10
4	metsulfuron-methyl	1:5-300:1	3:1-35:1	1-20	2-6
5	thifensulfuron-methyl in combination with metsulfuron-methyl	1:25-300:1 1:5-300:1	1:2-7:1 3:1-35:1	1-100 1-20	10-40 2-6
6	thifensulfuron-methyl in combination with tribenuron-methyl in combination with metsulfuron-methyl	1:10-300:1 1:10-300:1 1:5-300:1	1:1-7:1 1:1-7:1 3:1-35:1	1-50 1-20 1-20	10-20 5-10 2-6
7	chlorsulfuron	1:10-300:1	2:3-7:1	1-50	10-30
8	chlorsulfuron in combination with metsulfuron-methyl	1:10-300:1 1:2-300:1	1:1-7:1 5:1-35:1	1-50 1-10	10-20 2-4
9	triasulfuron	1:10-300:1	2:3-7:1	1-50	10-30
10	2,4-D	1:1000-3:1	1:100-1:3	100-4000	200-2000
11	dicamba	1:150-10:1	1:15-1:1	30-600	70-300
12	bromoxynil	1:500-3:1	1:50-1:4	100-2000	250-1000
13	MCPA	1:500-6:1	1:50-1:1	50-2000	100-1000
14	bromoxynil in combination with MCPA	1:500-3:1 1:500-6:1	1:50-1:4 1:50-1:1	100-2000 50-2000	250-1000 100-1000
15	fluroxypyr	1:150-10:1	1:15-1:1	30-600	70-300
16	clopyralid	1:125-30:1	1:12-1:1	10-500	50-250

17	fenoxaprop in combination with fenchlorazole	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
18	diclofop	1:500-3:1	1:50-1:7	100-2000	500-1000
19	tralkoxydim	1:125-3:1	1:15-1:2	100-500	150-300
20	clodinafop in combination with cloquintocet-mexyl	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
21	sulfosulfuron	1:12-300:1	1:2-20:1	1-50	4-40
22	prosulfuron	1:125-125:1	1:3-3:1	4-300	20-70
23	metribuzin	1:250-30:1	1:25-1:1	10-1000	50-500
24	glyphosate	1:500-3:1	1:50-1:4	100-2000	250-1000
25	ethametsulfuron-methyl	1:10-300:1	2:3-7:1	1-50	10-30

b) 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	tribenuron-methyl	1:10-300:1	1:1-14:1	1-50	5-20
2	thifensulfuron-methyl	1:25-300:1	1:2-7:1	1-100	10-40
3	thifensulfuron-methyl in combination with tribenuron-methyl	1:10-300:1 1:5-300:1	1:1-7:1 2:1-14:1	1-50 1-20	10-20 5-10
4	metsulfuron-methyl	1:5-300:1	3:1-35:1	1-20	2-6
5	thifensulfuron-methyl in combination with metsulfuron-methyl	1:25-300:1 1:5-300:1	1:2-7:1 3:1-35:1	1-100 1-20	10-40 2-6
6	thifensulfuron-methyl in combination with tribenuron-methyl in combination with metsulfuron-methyl	1:10-300:1 1:10-300:1 1:5-300:1	1:1-7:1 1:1-7:1 3:1-35:1	1-50 1-20 1-20	10-20 5-10 2-6
7	chlorsulfuron	1:10-300:1	2:3-7:1	1-50	10-30

8	chlorsulfuron in combination with metsulfuron-methyl	1:10-300:1 1:2-300:1	1:1-7:1 5:1-35:1	1-50 1-10	10-20 2-4
9	triasulfuron	1:10-300:1	2:3-7:1	1-50	10-30
10	2,4-D	1:1000-3:1	1:100-1:3	100-4000	200-2000
11	dicamba	1:150-10:1	1:15-1:1	30-600	70-300
12	bromoxynil	1:500-3:1	1:50-1:4	100-2000	250-1000
13	MCPA	1:500-6:1	1:50-1:1	50-2000	100-1000
14	bromoxynil in combination with MCPA	1:500-3:1 1:500-6:1	1:50-1:4 1:50-1:1	100-2000 50-2000	250-1000 100-1000
15	fluroxypyr	1:150-10:1	1:15-1:1	30-600	70-300
16	clopyralid	1:125-30:1	1:12-1:1	10-500	50-250
17	fenoxaprop in combination with fenchlorazole	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
18	diclofop	1:500-3:1	1:50-1:7	100-2000	500-1000
19	tralkoxydim	1:125-3:1	1:15-1:2	100-500	150-300
20	clodinafop in combination with cloquintocet-mexyl	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
21	sulfosulfuron	1:12-300:1	1:2-20:1	1-50	4-40
22	prosulfuron	1:125-125:1	1:3-3:1	4-300	20-70
23	metribuzin	1:250-30:1	1:25-1:1	10-1000	50-500
24	glyphosate	1:500-3:1	1:50-1:4	100-2000	250-1000
25	ethametsulfuron-methyl	1:10-300:1	2:3-7:1	1-50	10-30

c) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	tribenuron-methyl	1:10-300:1	1:1-14:1	1-50	5-20
2	thifensulfuron-methyl	1:25-300:1	1:2-7:1	1-100	10-40
3	thifensulfuron-methyl in combination with tribenuron-methyl	1:10-300:1 1:5-300:1	1:1-7:1 2:1-14:1	1-50 1-20	10-20 5-10
4	metsulfuron-methyl	1:5-300:1	3:1-35:1	1-20	2-6
5	thifensulfuron-methyl in combination with metsulfuron-methyl	1:25-300:1 1:5-300:1	1:2-7:1 3:1-35:1	1-100 1-20	10-40 2-6
6	thifensulfuron-methyl in combination with tribenuron-methyl in combination with metsulfuron-methyl	1:10-300:1 1:10-300:1 1:5-300:1	1:1-7:1 1:1-7:1 3:1-35:1	1-50 1-20 1-20	10-20 5-10 2-6
7	chlorsulfuron	1:10-300:1	2:3-7:1	1-50	10-30
8	chlorsulfuron in combination with metsulfuron-methyl	1:10-300:1 1:2-300:1	1:1-7:1 5:1-35:1	1-50 1-10	10-20 2-4
9	triasulfuron	1:10-300:1	2:3-7:1	1-50	10-30
10	2,4-D	1:1000-3:1	1:100-1:3	100-4000	200-2000
11	dicamba	1:150-10:1	1:15-1:1	30-600	70-300
12	bromoxynil	1:500-3:1	1:50-1:4	100-2000	250-1000
13	MCPA	1:500-6:1	1:50-1:1	50-2000	100-1000
14	bromoxynil in combination with MCPA	1:500-3:1 1:500-6:1	1:50-1:4 1:50-1:1	100-2000 50-2000	250-1000 100-1000
15	fluroxypyr	1:150-10:1	1:15-1:1	30-600	70-300
16	clopyralid	1:125-30:1	1:12-1:1	10-500	50-250
17	fenoxaprop in combination with fenchlorazole	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
18	diclofop	1:500-3:1	1:50-1:7	100-2000	500-1000

19	tralkoxydim	1:125-3:1	1:15-1:2	100-500	150-300
20	clodinafop in combination with cloquintocet-mexyl	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
21	sulfosulfuron	1:12-300:1	1:2-20:1	1-50	4-40
22	prosulfuron	1:125-125:1	1:3-3:1	4-300	20-70
23	metribuzin	1:250-30:1	1:25-1:1	10-1000	50-500
24	glyphosate	1:500-3:1	1:50-1:4	100-2000	250-1000
25	ethametsulfuron-methyl	1:10-300:1	2:3-7:1	1-50	10-30

d) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S*,*S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	tribenuron-methyl	1:10-300:1	1:1-14:1	1-50	5-20
2	thifensulfuron-methyl	1:25-300:1	1:2-7:1	1-100	10-40
3	thifensulfuron-methyl in combination with tribenuron-methyl	1:10-300:1 1:5-300:1	1:1-7:1 2:1-14:1	1-50 1-20	10-20 5-10
4	metsulfuron-methyl	1:5-300:1	3:1-35:1	1-20	2-6
5	thifensulfuron-methyl in combination with metsulfuron-methyl	1:25-300:1 1:5-300:1	1:2-7:1 3:1-35:1	1-100 1-20	10-40 2-6
6	thifensulfuron-methyl in combination with tribenuron-methyl in combination with metsulfuron-methyl	1:10-300:1 1:10-300:1 1:5-300:1	1:1-7:1 1:1-7:1 3:1-35:1	1-50 1-20 1-20	10-20 5-10 2-6
7	chlorsulfuron	1:10-300:1	2:3-7:1	1-50	10-30
8	chlorsulfuron in combination with metsulfuron-methyl	1:10-300:1 1:2-300:1	1:1-7:1 5:1-35:1	1-50 1-10	10-20 2-4

9	triasulfuron	1:10-300:1	2:3-7:1	1-50	10-30
10	2,4-D	1:1000-3:1	1:100-1:3	100-4000	200-2000
11	dicamba	1:150-10:1	1:15-1:1	30-600	70-300
12	bromoxynil	1:500-3:1	1:50-1:4	100-2000	250-1000
13	MCPA	1:500-6:1	1:50-1:1	50-2000	100-1000
14	bromoxynil in combination with MCPA	1:500-3:1 1:500-6:1	1:50-1:4 1:50-1:1	100-2000 50-2000	250-1000 100-1000
15	fluroxypyr	1:150-10:1	1:15-1:1	30-600	70-300
16	clopyralid	1:125-30:1	1:12-1:1	10-500	50-250
17	fenoxaprop in combination with fenchlorazole	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
18	diclofop	1:500-3:1	1:50-1:7	100-2000	500-1000
19	tralkoxydim	1:125-3:1	1:15-1:2	100-500	150-300
20	clodinafop in combination with cloquintocet-mexyl	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
21	sulfosulfuron	1:12-300:1	1:2-20:1	1-50	4-40
22	prosulfuron	1:125-125:1	1:3-3:1	4-300	20-70
23	metribuzin	1:250-30:1	1:25-1:1	10-1000	50-500
24	glyphosate	1:500-3:1	1:50-1:4	100-2000	250-1000
25	ethametsulfuron-methyl	1:10-300:1	2:3-7:1	1-50	10-30

e) 2-[(3-chloro-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	tribenuron-methyl	1:10-300:1	1:1-14:1	1-50	5-20
2	thifensulfuron-methyl	1:25-300:1	1:2-7:1	1-100	10-40

3	thifensulfuron-methyl in combination with tribenuron-methyl	1:10-300:1 1:5-300:1	1:1-7:1 2:1-14:1	1-50 1-20	10-20 5-10
4	metsulfuron-methyl	1:5-300:1	3:1-35:1	1-20	2-6
5	thifensulfuron-methyl in combination with metsulfuron-methyl	1:25-300:1 1:5-300:1	1:2-7:1 3:1-35:1	1-100 1-20	10-40 2-6
6	thifensulfuron-methyl in combination with tribenuron-methyl in combination with metsulfuron-methyl	1:10-300:1 1:10-300:1 1:5-300:1	1:1-7:1 1:1-7:1 3:1-35:1	1-50 1-20 1-20	10-20 5-10 2-6
7	chlorsulfuron	1:10-300:1	2:3-7:1	1-50	10-30
8	chlorsulfuron in combination with metsulfuron-methyl	1:10-300:1 1:2-300:1	1:1-7:1 5:1-35:1	1-50 1-10	10-20 2-4
9	triasulfuron	1:10-300:1	2:3-7:1	1-50	10-30
10	2,4-D	1:1000-3:1	1:100-1:3	100-4000	200-2000
11	dicamba	1:150-10:1	1:15-1:1	30-600	70-300
12	bromoxynil	1:500-3:1	1:50-1:4	100-2000	250-1000
13	MCPA	1:500-6:1	1:50-1:1	50-2000	100-1000
14	bromoxynil in combination with MCPA	1:500-3:1 1:500-6:1	1:50-1:4 1:50-1:1	100-2000 50-2000	250-1000 100-1000
15	fluroxypyr	1:150-10:1	1:15-1:1	30-600	70-300
16	clopyralid	1:125-30:1	1:12-1:1	10-500	50-250
17	fenoxaprop in combination with fenchlorazole	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
18	diclofop	1:500-3:1	1:50-1:7	100-2000	500-1000
19	tralkoxydim	1:125-3:1	1:15-1:2	100-500	150-300
20	clodinafop in combination with cloquintocet-mexyl	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
21	sulfosulfuron	1:12-300:1	1:2-20:1	1-50	4-40
22	prosulfuron	1:125-125:1	1:3-3:1	4-300	20-70
23	metribuzin	1:250-30:1	1:25-1:1	10-1000	50-500

24	glyphosate	1:500-3:1	1:50-1:4	100-2000	250-1000
25	ethametsulfuron-methyl	1:10-300:1	2:3-7:1	1-50	10-30

f) 2-[(4,5-dihydro-2,7,10-trimethyl-2*H*[1]benzothiepino[5,4-c]pyrazol-9-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	tribenuron-methyl	1:10-300:1	1:1-14:1	1-50	5-20
2	thifensulfuron-methyl	1:25-300:1	1:2-7:1	1-100	10-40
3	thifensulfuron-methyl in combination with tribenuron-methyl	1:10-300:1 1:5-300:1	1:1-7:1 2:1-14:1	1-50 1-20	10-20 5-10
4	metsulfuron-methyl	1:5-300:1	3:1-35:1	1-20	2-6
5	thifensulfuron-methyl in combination with metsulfuron-methyl	1:25-300:1 1:5-300:1	1:2-7:1 3:1-35:1	1-100 1-20	10-40 2-6
6	thifensulfuron-methyl in combination with tribenuron-methyl in combination with metsulfuron-methyl	1:10-300:1 1:10-300:1 1:5-300:1	1:1-7:1 1:1-7:1 3:1-35:1	1-50 1-20 1-20	10-20 5-10 2-6
7	chlorsulfuron	1:10-300:1	2:3-7:1	1-50	10-30
8	chlorsulfuron in combination with metsulfuron-methyl	1:10-300:1 1:2-300:1	1:1-7:1 5:1-35:1	1-50 1-10	10-20 2-4
9	triasulfuron	1:10-300:1	2:3-7:1	1-50	10-30
10	2,4-D	1:1000-3:1	1:100-1:3	100-4000	200-2000
11	dicamba	1:150-10:1	1:15-1:1	30-600	70-300
12	bromoxynil	1:500-3:1	1:50-1:4	100-2000	250-1000
13	MCPA	1:500-6:1	1:50-1:1	50-2000	100-1000

14	bromoxynil in combination with MCPA	1:500-3:1 1:500-6:1	1:50-1:4 1:50-1:1	100-2000 50-2000	250-1000 100-1000
15	fluroxypyr	1:150-10:1	1:15-1:1	30-600	70-300
16	clopyralid	1:125-30:1	1:12-1:1	10-500	50-250
17	fenoxaprop in combination with fenchlorazole	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
18	diclofop	1:500-3:1	1:50-1:7	100-2000	500-1000
19	tralkoxydim	1:125-3:1	1:15-1:2	100-500	150-300
20	clodinafop in combination with cloquintocet-mexyl	1:50-30:1 1:12-300:1	1:5-2:1 1:1-7:1	10-200 1-50	40-100 10-25
21	sulfosulfuron	1:12-300:1	1:2-20:1	1-50	4-40
22	prosulfuron	1:125-125:1	1:3-3:1	4-300	20-70
23	metribuzin	1:250-30:1	1:25-1:1	10-1000	50-500
24	glyphosate	1:500-3:1	1:50-1:4	100-2000	250-1000
25	ethametsulfuron-methyl	1:10-300:1	2:3-7:1	1-50	10-30

Preferred for better control of undesired vegetation in corn (e.g., lower use rate, broader spectrum of weeds controlled, or enhanced crop safety) or for preventing the development of resistant weeds in corn are mixtures of a compound of this invention with one or more of the herbicides selected from the group thifensulfuron-methyl, rimsulfuron, nicosulfuron, primisulfuron, atrazine, terbuthylazine, 2,4-D, dicamba, bromoxynil, imazethapyr, clopyralid, prosulfuron, glyphosate, glyphosate-trimesium, glufosinate, fluthiacet-methyl, quizalofop-P-ethyl, bentazone, flumetsulam, halosulfuron, sethoxydim, and flumiclorac-pentyl.

Specifically preferred mixtures for use in corn are selected from the group:

a) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	rimsulfuron	1:5-300:1	1:1-70:1	1-20	1-10
2	thifensulfuron-methyl	1:2-300:1	1:1-70:1	1-10	1-5
3	nicosulfuron	1:10-300:1	1:1-70:1	1-50	1-10
4	rimsulfuron in combination with nicosulfuron	1:5-300:1 1:10-300:1	1:1-70:1 1:1-70:1	1-20 1-50	1-10 1-10
5	rimsulfuron in combination with thifensulfuron-methyl	1:5-300:1 1:2-300:1	1:1-70:1 1:1-70:1	1-20 1-10	1-10 1-5
6	prosulfuron	1:10-300:1	2:1-70:1	1-50	1-10
7	prosulfuron in combination with primisulfuron	1:10-300:1 1:10-300:1	2:1-70:1 2:1-70:1	1-50 1-50	1-10 1-10
8	atrazine	1:500-3:1	1:25-1:1	100-2000	100-500
9	terbuthylazine	1:500-3:1	1:25-1:1	100-2000	100-500
10	dicamba	1:125-30:1	1:5-7:1	10-500	10-100
11	2,4-D	1:250-6:1	1:25-1:1	50-1000	50-500
12	bromoxynil	1:250-6:1	1:25-1:1	50-1000	50-500
13	imazethapyr	1:25-300:1	1:2-14:1	1-100	5-50
14	glyphosate	1:250-6:1	1:25-1:1	50-1000	50-500
15	glufosinate	1:250-6:1	1:25-1:1	50-1000	50-500
16	glyphosate-trimesium	1:250-6:1	1:25-1:1	50-1000	50-500

b) 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	rimsulfuron	1:5-300:1	1:1-70:1	1-20	1-10
2	thifensulfuron-methyl	1:2-300:1	1:1-70:1	1-10	1-5
3	nicosulfuron	1:10-300:1	1:1-70:1	1-50	1-10
4	rimsulfuron in combination with nicosulfuron	1:5-300:1 1:10-300:1	1:1-70:1 1:1-70:1	1-20 1-50	1-10 1-10
5	rimsulfuron in combination with thifensulfuron-methyl	1:5-300:1 1:2-300:1	1:1-70:1 1:1-70:1	1-20 1-10	1-10 1-5
6	prosulfuron	1:10-300:1	2:1-70:1	1-50	1-10
7	prosulfuron in combination with primisulfuron	1:10-300:1 1:10-300:1	2:1-70:1 2:1-70:1	1-50 1-50	1-10 1-10
8	atrazine	1:500-3:1	1:25-1:1	100-2000	100-500
9	terbuthylazine	1:500-3:1	1:25-1:1	100-2000	100-500
10	dicamba	1:125-30:1	1:5-7:1	10-500	10-100
11	2,4-D	1:250-6:1	1:25-1:1	50-1000	50-500
12	bromoxynil	1:250-6:1	1:25-1:1	50-1000	50-500
13	imazethapyr	1:25-300:1	1:2-14:1	1-100	5-50
14	glyphosate	1:250-6:1	1:25-1:1	50-1000	50-500
15	glufosinate	1:250-6:1	1:25-1:1	50-1000	50-500
16	glyphosate-trimesium	1:250-6:1	1:25-1:1	50-1000	50-500

c) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	rimsulfuron	1:5-300:1	1:1-70:1	1-20	1-10
2	thifensulfuron-methyl	1:2-300:1	1:1-70:1	1-10	1-5
3	nicosulfuron	1:10-300:1	1:1-70:1	1-50	1-10
4	rimsulfuron in combination with nicosulfuron	1:5-300:1 1:10-300:1	1:1-70:1 1:1-70:1	1-20 1-50	1-10 1-10
5	rimsulfuron in combination with thifensulfuron-methyl	1:5-300:1 1:2-300:1	1:1-70:1 1:1-70:1	1-20 1-10	1-10 1-5
6	prosulfuron	1:10-300:1	2:1-70:1	1-50	1-10
7	prosulfuron in combination with primisulfuron	1:10-300:1 1:10-300:1	2:1-70:1 2:1-70:1	1-50 1-50	1-10 1-10
8	atrazine	1:500-3:1	1:25-1:1	100-2000	100-500
9	terbuthylazine	1:500-3:1	1:25-1:1	100-2000	100-500
10	dicamba	1:125-30:1	1:5-7:1	10-500	10-100
11	2,4-D	1:250-6:1	1:25-1:1	50-1000	50-500
12	bromoxynil	1:250-6:1	1:25-1:1	50-1000	50-500
13	imazethapyr	1:25-300:1	1:2-14:1	1-100	5-50
14	glyphosate	1:250-6:1	1:25-1:1	50-1000	50-500
15	glufosinate	1:250-6:1	1:25-1:1	50-1000	50-500
16	glyphosate-trimesium	1:250-6:1	1:25-1:1	50-1000	50-500

d) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-c]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	rimsulfuron	1:5-300:1	1:1-70:1	1-20	1-10
2	thifensulfuron-methyl	1:2-300:1	1:1-70:1	1-10	1-5
3	nicosulfuron	1:10-300:1	1:1-70:1	1-50	1-10
4	rimsulfuron in combination with nicosulfuron	1:5-300:1 1:10-300:1	1:1-70:1 1:1-70:1	1-20 1-50	1-10 1-10
5	rimsulfuron in combination with thifensulfuron-methyl	1:5-300:1 1:2-300:1	1:1-70:1 1:1-70:1	1-20 1-10	1-10 1-5
6	prosulfuron	1:10-300:1	2:1-70:1	1-50	1-10
7	prosulfuron in combination with primisulfuron	1:10-300:1 1:10-300:1	2:1-70:1 2:1-70:1	1-50 1-50	1-10 1-10
8	atrazine	1:500-3:1	1:25-1:1	100-2000	100-500
9	terbuthylazine	1:500-3:1	1:25-1:1	100-2000	100-500
10	dicamba	1:125-30:1	1:5-7:1	10-500	10-100
11	2,4-D	1:250-6:1	1:25-1:1	50-1000	50-500
12	bromoxynil	1:250-6:1	1:25-1:1	50-1000	50-500
13	imazethapyr	1:25-300:1	1:2-14:1	1-100	5-50
14	glyphosate	1:250-6:1	1:25-1:1	50-1000	50-500
15	glufosinate	1:250-6:1	1:25-1:1	50-1000	50-500
16	glyphosate-trimesium	1:250-6:1	1:25-1:1	50-1000	50-500

e) 2-[(3-chloro-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	rimsulfuron	1:5-300:1	1:1-70:1	1-20	1-10
2	thifensulfuron-methyl	1:2-300:1	1:1-70:1	1-10	1-5
3	nicosulfuron	1:10-300:1	1:1-70:1	1-50	1-10
4	rimsulfuron in combination with nicosulfuron	1:5-300:1 1:10-300:1	1:1-70:1 1:1-70:1	1-20 1-50	1-10 1-10
5	rimsulfuron in combination with thifensulfuron-methyl	1:5-300:1 1:2-300:1	1:1-70:1 1:1-70:1	1-20 1-10	1-10 1-5
6	prosulfuron	1:10-300:1	2:1-70:1	1-50	1-10
7	prosulfuron in combination with primisulfuron	1:10-300:1 1:10-300:1	2:1-70:1 2:1-70:1	1-50 1-50	1-10 1-10
8	atrazine	1:500-3:1	1:25-1:1	100-2000	100-500
9	terbuthylazine	1:500-3:1	1:25-1:1	100-2000	100-500
10	dicamba	1:125-30:1	1:5-7:1	10-500	10-100
11	2,4-D	1:250-6:1	1:25-1:1	50-1000	50-500
12	bromoxynil	1:250-6:1	1:25-1:1	50-1000	50-500
13	imazethapyr	1:25-300:1	1:2-14:1	1-100	5-50
14	glyphosate	1:250-6:1	1:25-1:1	50-1000	50-500
15	glufosinate	1:250-6:1	1:25-1:1	50-1000	50-500
16	glyphosate-trimesium	1:250-6:1	1:25-1:1	50-1000	50-500

f) 2-[(4,5-dihydro-2,7,10-trimethyl-2*H*[1]benzothiepino[5,4-*c*]pyrazol-9-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S,S*-dioxide (mixture partner A, generally applied at a rate of 4 to 280 g/ha, preferably applied at a rate of 8 to 70 g/ha) in combination with:

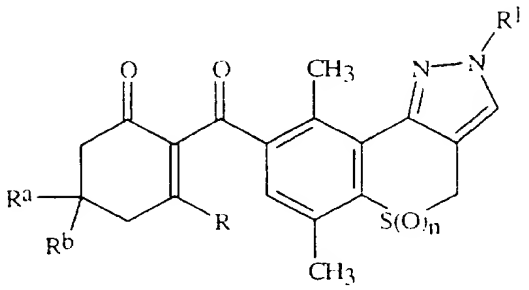
Combination Number	Mixture Partner B	Ratio Range of A:B	Preferred Ratio Range of A:B	Use Rate Range of B (g/ha)	Preferred Use Rate Range of B (g/ha)
1	rimsulfuron	1:5-300:1	1:1-70:1	1-20	1-10
2	thifensulfuron-methyl	1:2-300:1	1:1-70:1	1-10	1-5
3	nicosulfuron	1:10-300:1	1:1-70:1	1-50	1-10
4	rimsulfuron in combination with nicosulfuron	1:5-300:1 1:10-300:1	1:1-70:1 1:1-70:1	1-20 1-50	1-10 1-10
5	rimsulfuron in combination with thifensulfuron-methyl	1:5-300:1 1:2-300:1	1:1-70:1 1:1-70:1	1-20 1-10	1-10 1-5
6	prosulfuron	1:10-300:1	2:1-70:1	1-50	1-10
7	prosulfuron in combination with primisulfuron	1:10-300:1 1:10-300:1	2:1-70:1 2:1-70:1	1-50 1-50	1-10 1-10
8	atrazine	1:500-3:1	1:25-1:1	100-2000	100-500
9	terbuthylazine	1:500-3:1	1:25-1:1	100-2000	100-500
10	dicamba	1:125-30:1	1:5-7:1	10-500	10-100
11	2,4-D	1:250-6:1	1:25-1:1	50-1000	50-500
12	bromoxynil	1:250-6:1	1:25-1:1	50-1000	50-500
13	imazethapyr	1:25-300:1	1:2-14:1	1-100	5-50
14	glyphosate	1:250-6:1	1:25-1:1	50-1000	50-500
15	glufosinate	1:250-6:1	1:25-1:1	50-1000	50-500
16	glyphosate-trimesium	1:250-6:1	1:25-1:1	50-1000	50-500

A herbicidally effective amount of the compounds of this invention is determined by a number of factors. These factors include: formulation selected, method of application, amount and type of vegetation present, growing conditions, etc. In general, a herbicidally effective amount of compounds of this invention is 0.001 to 20 kg/ha with a preferred range of 0.004 to 1.0 kg/ha. One skilled in the art can easily determine the herbicidally effective amount necessary for the desired level of weed control.

The following Tests demonstrate the control efficacy of the compounds of this invention against specific weeds. The weed control afforded by the compounds is not limited, however, to these species. See Index Tables A-D for compound descriptions. The following abbreviation is used in the Index Tables which follow: Ph = phenyl. The abbreviation "dec." indicates that the compound appeared to decompose on melting.

The abbreviation "Ex." stands for "Example" and is followed by a number indicating in which example the compound is prepared.

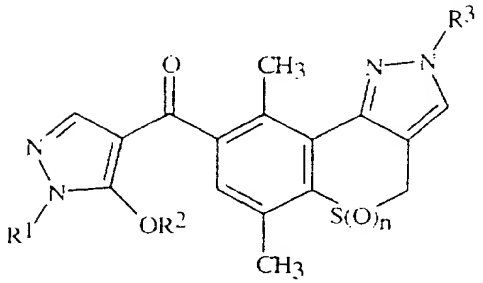
Index Table A



Cmpd	R^a	R^b	R	R^1	n	m.p. (°C)
1	H	H	OH	CH_3	2	228 (dec.)
2	H	H	OH	CH_2CH_3	2	205 (dec.)
3	H	H	OH	$CH(CH_3)_2$	2	92 (dec.)
4	H	H	OH	$CH_2CH_2CH_3$	2	104 (dec.)
5	CH_3	CH_3	OH	CH_3	2	106 (dec.)
6	CH_3	H	OH	CH_3	2	>210
7	H	H	OH	CH_3	0	98 (dec.)
8	H	H	OH	CH_3	1	95 (dec.)
9	H	H	Cl	CH_2CH_3	2	157-159 (dec.)
10	H	H	OCH_3	CH_2CH_3	2	semi-solid *
11	H	H	OSO_2Ph	CH_2CH_3	2	semi-solid *
12	H	H	$O^-Et_3NH^+$	CH_2CH_3	2	171-182
13	H	H	O^-K^+	CH_2CH_3	2	208-210 (dec.)
14	H	H	O^-Na^+	CH_2CH_3	2	210-212 (dec.)
32	H	H	OH	phenyl	2	237-240
33	H	H	(2-CH_3)phenylthio	phenyl	2	>245
34	H	H	(2-Cl)phenylthio	$CH_2CH_2CH_3$	2	204-208
35	H	H	(3-methoxy)phenylthio	$CH_2CH_2CH_3$	2	198-200
36	H	H	(4-CH_3)phenylthio	$CH_2CH_2CH_3$	2	218-224
37	H	H	(2-CH_3)phenylthio	$CH_2CH_2CH_3$	2	226-228
38	H	H	(2,6-diCl)phenylthio	$CH_2CH_2CH_3$	2	190-197
39	H	H	phenylthio	$CH_2CH_2CH_3$	2	230-233

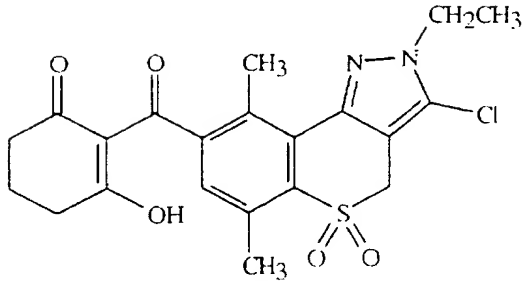
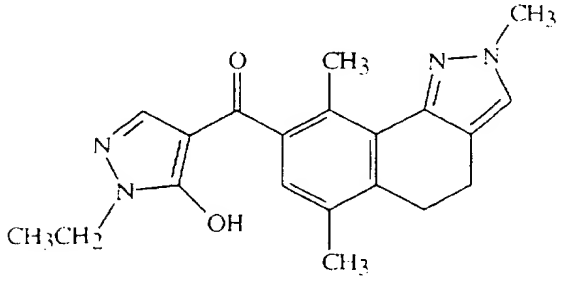
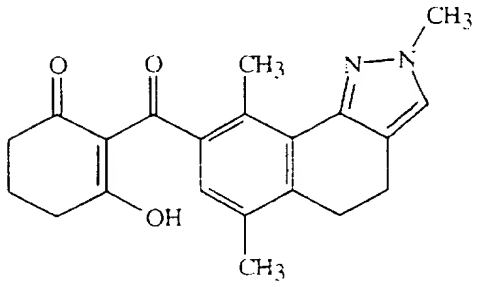
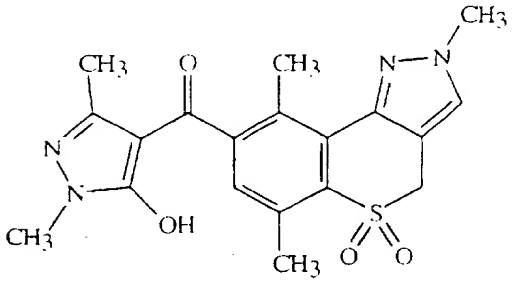
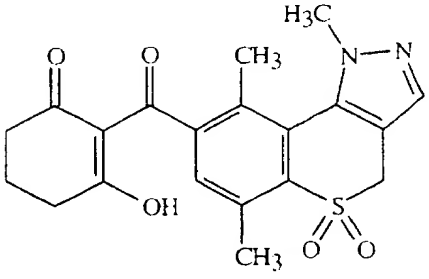
40	H	H	benzylthio	$CH_2CH_2CH_3$	2	197-199
41	H	H	phenylthio	CH_2CH_3	2	261-262
42	H	H	Cl	CH_3	2	140-141 (dec.)
43	H	H	O^-Na^+	CH_3	2	>230

Index Table B

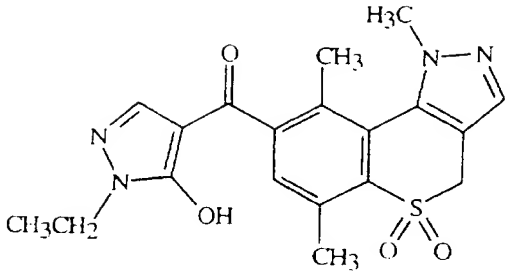


Cmpd	R^1	R^2	R^3	n	m.p. (°C)
15	CH_2CH_3	H	CH_2CH_3	2	97 (dec.)
16	CH_2CH_3	H	CH_3	2	133 (dec.)
17	CH_3	H	CH_3	2	134 (dec.)
18	CH_2CH_3	SO_2CH_2Cl	CH_3	2	oil *
19	CH_3	H	CH_3	0	90-91 (dec.)
20	CH_2CH_3	H	CH_3	0	58 (dec.)
21	CH_3	H	CH_3	1	semi-solid *
22	CH_2CH_3	H	CH_3	1	124 (dec.)
23	CH_3	SO_2Ph	CH_3	2	78 (dec.)
44	CH_2CH_3	(4-CH_3)phenylsulfonyl	CH_3	2	74-75
45	CH_2CH_3	C(=O)Ph	CH_3	2	208-210
46	CH_2CH_3	SO_2CH_3	CH_3	2	194-196
47	CH_2CH_3	SO_2Ph	CH_3	2	oil *
48	CH_2CH_3	Na	CH_3	2	>230

Index Table C

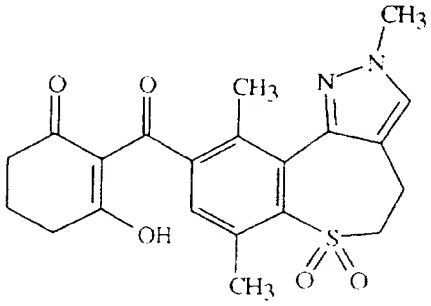
Cmpd No.	Structure	m.p. (°C)
24		196 (dec.)
25		150-152
26		75 (dec.)
27		120 (dec.)
28		>220

29

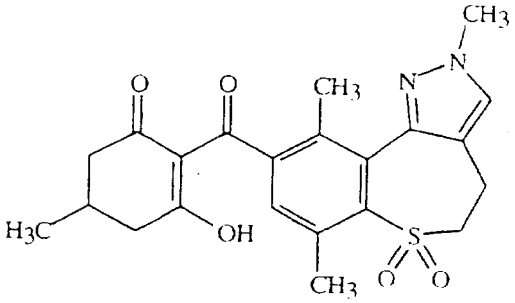


96 (dec.)

30

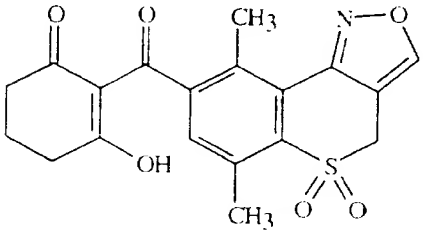


31



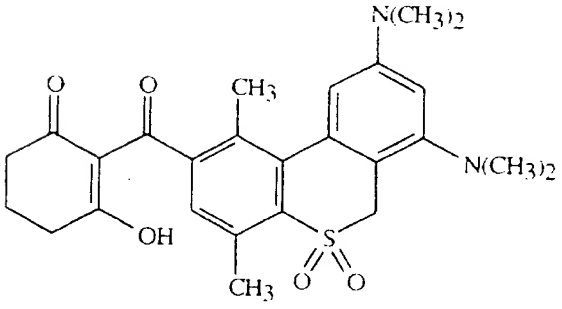
115 (dec.)

49

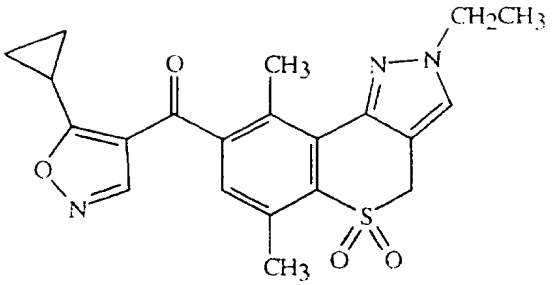
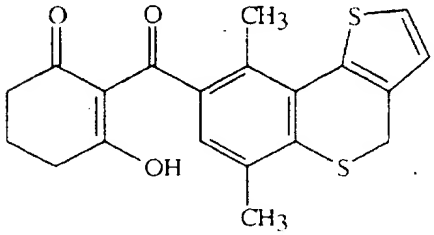
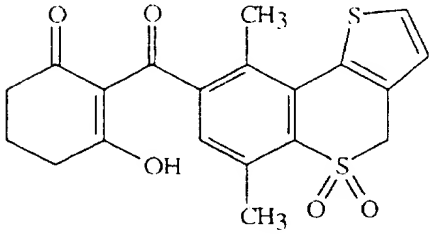
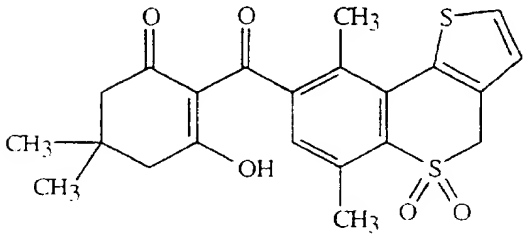
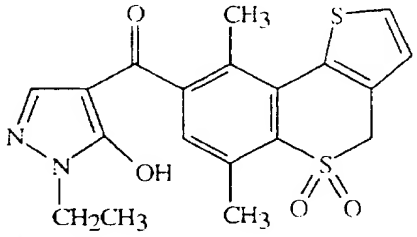


230-234 (dec.)

50



122 (dec.)

51		69-71
52		171-173
53		212-216
54		202-206
55		229-250

*See Index Table D for ^{1}H NMR data.

Index Table D

Cmpd No.	^{1}H NMR Data ($CDCl_3$ solution unless indicated otherwise)[a]
10	δ 7.44 (s, 1H), 6.78 (s, 1H), 4.38 (s, 2H), 4.2 (q, 2H), 3.1 (m, 2H), 2.8 (m, 2H), 2.71 (s, 3H), 2.54 (s, 3H), 2.2 (m, 1H), 1.8 (m, 1H), 1.52 (t, 3H), 1.48 (s, 3H).
11	δ 7.7-7.3 (m, 6H), 7.1 (s, 1H), 4.36 (s, 2H), 4.21 (q, 2H), 3.1 (t, 2H), 2.7-2.5 (m, 8H), 2.2 (m, 2H), 1.54 (t, 3H).
18	δ 7.48 (s, 1H), 7.43 (s, 1H), 7.12 (s, 1H), 5.46 (s, 2H), 4.41 (s, 2H), 4.22 (q, 2H), 3.97 (s, 3H), 2.76 (s, 3H), 2.64 (s, 3H), 1.54 (t, 3H).
21	δ 7.50 (s, 1H), 7.36 (s, 1H), 7.2 (s, 1H), 4.4 (d, 1H), 4.0 (s, 3H), 3.8 (d, 1H), 3.72 (s, 3H), 2.75 (s, 3H), 2.74 (s, 3H).
30	δ 7.29 (s, 1H), 6.92 (s, 1H), 3.95 (s, 3H), 3.64 (t, 2H), 2.9-2.74 (m, 4H), 2.73 (s, 3H), 2.44 (m, 2H), 2.26 (s, 3H), 2.05 (m, 2H).
47	δ 7.97 (d, 2H), 7.7-7.5 (m, 3H), 7.45 (s, 1H), 7.34 (s, 1H), 6.91 (s, 1H), 4.3 (s, 2H), 4.12 (q, 2H), 3.86 (s, 3H), 2.63 (s, 3H), 2.51 (s, 3H), 1.43 (t, 3H).

[a] ^{1}H NMR data are in ppm downfield from tetramethylsilane. Couplings are designated by (s)-singlet, (d)-doublet, (t)-triplet, (q)-quartet, (m)-multiplet.

TEST A

The compounds evaluated in this test were formulated in a non-phytotoxic solvent mixture which included a surfactant and applied to the soil surface before plant seedlings emerged (preemergence application), to water that covered the soil surface (flood application), and to plants that were in the one-to-four leaf stage (postemergence application). A sandy loam soil was used for the preemergence and postemergence tests, while a silt loam soil was used in the flood test. Water depth was approximately 2.5 cm for the flood test and was maintained at this level for the duration of the test.

Plant species in the preemergence and postemergence tests consisted of barnyardgrass (*Echinochloa crus-galli*), barley (*Hordeum vulgare*), bedstraw (*Galium aparine*), blackgrass (*Alopecurus myosuroides*), chickweed (*Stellaria media*), cocklebur (*Xanthium strumarium*), corn (*Zea mays*), cotton (*Gossypium hirsutum*), crabgrass (*Digitaria sanguinalis*), downy brome (*Bromus tectorum*), giant foxtail (*Setaria faberii*), johnsongrass (*Sorghum halpense*), lambsquarters (*Chenopodium album*), morningglory (*Ipomoea hederacea*), pigweed (*Amaranthus retroflexus*), rape (*Brassica napus*), ryegrass (*Lolium multiflorum*), soybean (*Glycine max*), speedwell (*Veronica persica*), sugar beet (*Beta vulgaris*), velvetleaf (*Abutilon theophrasti*), wheat (*Triticum aestivum*), wild buckwheat (*Polygonum convolvulus*), and wild oat (*Avena fatua*). All plant species were planted one day before application of the compound for the preemergence portion of this test. Plantings of these species were adjusted to produce plants of appropriate size for the postemergence portion of the test. Plant species in the flood test consisted of rice (*Oryza sativa*), umbrella sedge (*Cyperus difformis*), duck salad (*Heteranthera limosa*), barnyardgrass (*Echinochloa crus-galli*) and Late watergrass (*Echinochloa oryzicola*) grown to the 2 leaf stage for testing.

All plant species were grown using normal greenhouse practices. Visual evaluations of injury expressed on treated plants, when compared to untreated controls, were recorded approximately fourteen to twenty one days after application of the test compound. Plant response this ratings, summarized in Table A, were recorded on a 0 to 100 scale where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

Table A	COMPOUND		
Rate 250 g/ha	1	19	28
POSTEMERGENCE			
Barley Igri	90	-	15
Barnyard 2	100	0	95
Barnyardgrass	90	-	90
Bedstraw	100	-	45
Blackgrass	95	-	40
Chickweed	100	-	50
Cocklebur	90	-	85
Corn	80	-	0
Cotton	100	-	90
Crabgrass	90	-	90
Downy Brome	85	-	25
Duck salad	70	15	60
Giant foxtail	90	-	85
Italn. Rygrass	85	-	0
Johnsongrass	100	-	90
Lambsquarter	100	-	100
Morningglory	100	-	95
Rape	100	-	85
Redroot Pigweed	95	-	90
Rice Japonica	95	0	95
Soybean	90	-	90
Speedwell	100	-	95
Sugar beet	100	-	100
Umbrella sedge	95	10	95
Velvetleaf	100	-	90
Watergrass 2	100	-	30
Wheat	80	-	45
Wild buckwheat	100	-	65
Wild oat	100	-	15

Table A	COMPOUND	
Rate 250 g/ha	1	28
PREEMERGENCE		
Barley Igri	65	0
Barnyardgrass	100	20
Bedstraw	40	0
Blackgrass	65	0
Chickweed	100	30
Cocklebur	100	0
Corn	10	30
Cotton	100	45
Crabgrass	100	100
Downy Brome	90	0
Giant foxtail	100	0
Italn. Rygrass	80	0
Johnsongrass	100	0
Lambsquarter	100	95
Morningglory	80	50
Rape	30	20
Redroot Pigweed	100	90
Soybean	70	60
Speedwell	100	95
Sugar beet	100	100
Velvetleaf	100	100
Wheat	0	0
Wild buckwheat	80	55
Wild oat	85	0

Table A	COMPOUND									
Rate 125 g/ha	1	2	3	12	14	16	19	25	26	28
POSTEMERGENCE										
Barley Igri	80	70	30	55	65	0	-	0	10	10
Barnyard 2	100	-	80	90	-	-	10	15	25	80
Barnyardgrass	90	95	95	100	95	100	-	90	90	90
Bedstraw	95	80	90	80	90	100	-	70	70	45
Blackgrass	95	95	60	85	90	80	-	0	30	35
Chickweed	100	100	100	100	100	100	-	-	-	50
Cocklebur	90	90	90	95	95	100	-	90	90	85
Corn	80	10	0	0	10	55	-	10	20	0
Cotton	100	100	90	100	100	100	-	70	90	90
Crabgrass	90	95	90	95	95	100	-	85	50	90
Downy Brome	85	90	60	80	90	65	-	0	0	25
Duck salad	70	-	50	90	-	-	0	10	70	35
Giant foxtail	90	95	70	95	95	100	-	60	70	70
Italn. Rygrass	85	75	50	95	70	0	-	0	0	0
Johnsongrass	95	100	90	80	95	90	-	20	40	80
Lambsquarter	100	100	95	100	100	95	-	90	90	100
Morningglory	100	90	90	90	90	90	-	40	90	90
Rape	100	90	80	-	95	10	-	50	90	85
Redroot Pigweed	95	90	90	100	95	95	-	90	80	-
Rice Japonica	95	-	55	90	-	-	0	0	60	95
Soybean	90	90	90	95	90	50	-	55	60	90
Speedwell	100	100	100	100	100	100	-	80	70	85
Sugar beet	100	100	100	100	100	100	-	-	-	100
Umbrella sedge	95	-	50	90	-	-	25	50	85	90
Velvetleaf	100	100	100	100	100	100	-	90	90	90
Watergrass 2	95	-	80	-	-	-	-	-	-	-
Wheat	70	90	50	70	85	0	-	0	0	30
Wild buckwheat	100	95	-	80	90	70	-	0	60	65
Wild oat	100	100	65	95	100	95	-	0	20	0

Table A	COMPOUND								
Rate 125 g/ha	1	2	3	12	14	15	25	26	28
PREEMERGENCE									
Barley Igri	0	0	0	0	0	0	0	0	0
Barnyardgrass	100	95	70	95	100	100	0	50	10
Bedstraw	30	50	10	70	55	90	0	30	0
Blackgrass	10	20	10	0	10	10	0	30	0
Chickweed	95	100	90	100	100	90	0	100	30
Cocklebur	100	20	75	35	40	20	0	0	0
Corn	0	0	0	0	0	0	0	0	0
Cotton	100	50	20	30	30	10	20	40	35
Crabgrass	100	100	100	100	100	100	0	70	65
Downy Brome	40	0	0	95	55	0	0	0	0
Giant foxtail	100	90	40	80	90	90	0	30	0
Italn. Rygrass	80	0	30	0	30	0	10	0	0
Johnsongrass	95	75	80	70	60	30	0	20	0
Lambsquarter	100	100	100	100	100	100	30	95	95
Morningglory	40	40	60	100	60	40	0	40	50
Rape	0	85	20		75	0	0	0	0
Redroot Pigweed	100	-	90	-		80	0	70	60
Soybean	70	30	30	40	40	0	10	30	50
Speedwell	100	100	95	100	100	100	-	30	80
Sugar beet	100	100	100	100	100	90	-	-	100
Velvetleaf	100	100	100	100	100	100	0	75	100
Wheat	0	30	0	0	35	0	0	0	0
Wild buckwheat	10	0	10	20	20	0	0	0	10
Wild oat	80	30	40	0	25	0	0	0	0

Table A	COMPOUND												
Rate 62 g/ha	1	2	3	4	12	14	16	18	19	24	25	26	28
POSTEMERGENCE													
Barley Igri	70	25	20	10	45	45	0	0	-	20	0	0	10
Barnyard 2	95	-	75	30	90	-	-	100	0	0	10	10	45
Barnyardgrass	90	95	95	90	100	95	100	90	-	90	90	90	90
Bedstraw	95	90	80	70	80	90	95	90	-	80	60	70	40
Blackgrass	90	60	50	60	75	90	70	60	-	60	0	30	20
Chickweed	100	100	100	90	100	100	100	95	-	95	-	70	50
Cocklebur	90	90	90	90	95	90	100	90	-	90	90	80	80
Corn	80	20	0	0	0	5	45	45	-	0	10	10	0
Cotton	100	100	90	95	100	100	100	100	-	80	60	80	90
Crabgrass	90	90	90	95	90	90	90	90	-	90	80	50	90
Downy Brome	80	65	30	30	80	80	20	60	-	75	0	0	10
Duck salad	50	-	30	40	70	-	-	70	0	0	0	0	35
Giant foxtail	90	90	50	70	90	90	90	90	-	80	50	60	50
Italn. Rygrass	60	70	20	30	60	50	0	30	-	10	0	0	0
Johnsongrass	95	50	90	70	80	90	70	100	-	70	20	35	60
Lambsquarter	100	100	95	100	100	100	95	100	-	90	70	90	100
Morningglory	95	95	90	90	90	90	90	90	-	90	30	85	90
Rape	95	95	80	70	-	90	10	0	-	-	30	80	40
Redroot Pigweed	95	95	90	90	95	90	90	90	-	75	90	70	90
Rice Japonica	90	-	25	50	80	-	-	25	20	0	0	50	55
Soybean	90	90	80	90	95	90	40	60	-	90	55	50	90
Speedwell	100	100	100	100	100	95	100	100	-	100	40	-	80
Sugar beet	100	100	100	100	100	100	100	80	-	-	-	-	100
Umbrella sedge	95	-	40	80	80	-	-	70	0	0	30	60	25
Velvetleaf	100	100	100	90	100	100	100	90	-	90	85	80	90
Watergrass 2	95	-	70	25		-	-	-	-		-	-	30
Wheat	45	50	40	30	65	75	0	10	-	20	0	0	20
Wild buckwheat	80	80	85	80	70	90	-	30	-	0	0	20	65
Wild oat	100	95	50	60	95	95	95	60	-	70	0	0	0

Table A

	COMPOUND											
Rate 62 g/ha	1	2	3	4	12	14	16	18	24	25	26	28
PREEMERGENCE												
Barley Igri	0	0	0	-	0	0	0	0	0	0	0	0
Barnyardgrass	95	85	50	60	45	90	30	10	0	0	10	0
Bedstraw	0	0	10	-	70	30	40	20	0	0	0	0
Blackgrass	0	20	0	-	-	10	0	20	10	0	20	0
Chickweed	95	100	45	-	100	100	80	60	50	0	90	10
Cocklebur	70	10	40	65	20	30	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	90	50	10	0	30	20	10	20	0	10	20	25
Crabgrass	100	95	100	80	100	100	70	100	70	0	40	30
Downy Brome	25	0	0	-	95	30	0	0	-	0	0	0
Giant foxtail	95	60	10	0	40	70	50	70	0	0	10	0
Italn. Rygrass	60	0	20	-	0	0	0	0	0	0	0	0
Johnsongrass	30	45	50	80	40	30	20	0	0	0	0	0
Lambsquarter	100	100	100	-	100	100	100	100	95	20	95	95
Morningglory	30	0	30	0	30	20	40	0	0	0	0	0
Rape	0	-	0	-	0	25	0	0	0	0	0	0
Redroot Pigweed	95	-	80	60	-	-	70	50	0	-	30	10
Soybean	50	30	10	10	30	30	0	0	0	0	0	40
Speedwell	95	100	95	-	100	100	100	100	100	0	30	80
Sugar beet	90	100	100	-	100	100	80	-	-	-	-	95
Velvetleaf	100	100	100	60	100	100	100	100	100	0	0	60
Wheat	0	30	0	-	0	35	0	0	0	0	0	0
Wild buckwheat	0	0	0	0	-	20	0	0	10	0	0	0
Wild oat	70	30	30	-	0	25	0	0	10	0	0	0

Table A	COMPOUND															
Rate 31 g/ha	1	2	3	4	5	6	12	14	16	18	19	24	25	26	27	2
POSTEMERGENCE																
Barley Igri	30	25	10	5	40	85	40	30	0	0	-	20	0	0	0	
Barnyard 2	95	80	70	20	20	20	90	-	20	10	20	0	0	0	15	1
Barnyardgrass	90	95	90	90	90	95	100	95	100	90	-	90	80	90	95	9
Bedstraw	90	70	80	70	100	80	65	70	80	90	-	80	30	60	75	3
Blackgrass	80	45	40	10	90	95	60	70	60	50	-	50	0	15	55	1
Chickweed	100	100	100	90	-	95	100	100	100	-	-	-	-	40		5
Cocklebur	90	90	90	90	90	90	90	90	95	90	-	90	90	80	90	7
Corn	70	0	0	0	0	0	0	0	40	30		0	0	5	30	
Cotton	100	95	90	95	90	100	100	100	100	100	-	80	40	60	80	8
Crabgrass	90	90	90	90	90	95	85	90	90	90	-	80	70	40	90	9
Downy Brome	70	50	10	10	70	75	0	70	0	60	-	40	0	0	30	1
Duck salad	40	0	10	30	80	75	70	-	80	50	0	0	0	0	70	
Giant foxtail	90	90	50	50	90	90	70	85	90	80	-	80	40	60	60	5
Italn. Rygrass	30	25	20	10	30	55	20	50	0	10	-	0	0	0	0	
Johnsongrass	95	75	70	40	90	90	70	85	60	80	-	60	10	30	80	5
Lambsquarter	100	100	95	90	100	100	90	100	95	90	-	70	60	90	100	10
Morningglory	90	95	90	90	90	90	90	90	90	90	-	90	20	80	70	9
Rape	90	80	70	50	80	50	-	40	0	0	-	90	0	50	70	4
Redroot Pigweed	90	90	90	75	90	80	90	90	85	90	-	-	75	50	90	9
Rice Japonica	75	30	35	40	45	35	30		20	10	0	0	0	0	60	2
Soybean	90	90	70	80	90	90	85	90	35	50	-	90	45	40	85	8
Speedwell	100	100	100	100	90	95	85	95	95	100	-	-	25	30	100	8

Sugar beet	100	100	100	100	-	100	100	100	100		-	-	-	-	-	10
Umbrella sedge	85	20	30	60	75	80	80		70	25	0	0	10	30	85	2
Velvetleaf	100	100	100	90	90	95	100	100	100	90	-	90	85	80	90	9
Watergrass 2	70	85	50	20	-	-	-	-	-	-	-	-	-	-	-	
Wheat	35	35	30	15	70	95	45	70	0	10		10	0	0	30	1
Wild buckwheat	70	75	80	50	75	95	65	90	70	20	-	0	0	0	40	5
Wild oat	100	80	35	40	90	100	75	90	95	40	-	70	0	0	70	

Table A — COMPOUND

Rate 31 g/ha	1	2	3	4	5	6	12	14	16	18	24	25	26	27	28	3
PREEMERGENCE																
Barley Igri	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	
Barnyardgrass	80	15	10	20	70	35	10	70	0	0	0	0	0	0	0	1
Bedstraw	0	0	10	-	40	0	25	30	0	10	0	0	0	70	0	
Blackgrass	0	0	0	-	10	15	0	10	0	20	0	0	10	0	0	
Chickweed	95	10	30	-	0	85	95	100	50	60	0	0	70	0	0	9
Cocklebur	30	20	30	30	20	0	-	20	0	0	0	0	0	0	0	
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cotton	30	30	10	0	0	30		10	0	20	0	0	10	0	20	3
Crabgrass	95	95	100	35	100	90	90	100	70	80	30	0	0	80	10	4
Downy Brome	0	0	0	-	0	0	95	30	0	0	0	0	0	0	0	
Giant foxtail	75	20	0	0	50	40	20	30	30	50	0	0	0	10	0	1
Italn. Rygrass	40	0	10	-	0	0	0	0	0	0	0	0	0	0	0	
Johnsongrass	20	10	-	0	10	20	20	20	0	0	0	0	0	0	0	
Lambsquarter	100	95	100	-	95	100	100	100	90	100	60	0	60	90	95	10
Morningglory	10	20	0	0	0	10	-	-	20	0	0	0	0	0	0	10
Rape	0	0	0	-	0	0	-	0	0	0	0	0	0	10	0	
Redroot Pigweed	30	80	70	30	70	-	-	-	50	-	0	0	0	70	-	7
Soybean	40	0	0	10	0	10	30	10	0	0	0	0	0	0	40	
Speedwell	70	100	95	-	0	100	100	100	100	100	0	-	-	50	80	10
Sugar beet	30	100	95	-	-	80	100	100	50			-			95	9
Velvetleaf	100	100	100	30	100	100	100	100	60	100	80	0	0	90	60	3
Wheat	0	0	0	-	0	30	0	30	0	0	0	0	0	0	0	
Wild buckwheat	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	
Wild oat	40	0	10	-	0	25	0	25	0	0	10	0	0	0	0	

Table A

	COMPOUND															
Rate 16 g/ha	1	2	3	4	5	6	12	14	16	18	24	25	26	27	30	31
POSTEMERGENCE																
Barley Igri	55	10	0	0	40	60	40	10	0	0	20	0	0	0	20	50
Barnyard 2	55	70	30	15	10	15	90	-	20	10	0	0	0	15	10	0
Barnyardgrass	95	90	90	90	90	95	95	95	100	90	90	40	85	95	100	95
Bedstraw	70	0	-	60	90	70	60	55	80	80	80	30	50	50	70	60
Blackgrass	85	35	35	0	75	90	40	60	30	30	50	0	10	35	50	80
Chickweed	100	100	95	70	90	90	95	95	90	-	-	-	-	-	90	-
Cocklebur	100	90	90	90	90	90	90	90	90	90	90	80	70	90	-	70
Corn	75	0	0	0	0	0	0	0	40	10	0	0	0	20	0	0
Cotton	100	95	85	85	70	100	100	90	90	90	70	40	45	80	90	80
Crabgrass	95	90	85	90	90	90	75	85	85	85	80	60	40	80	95	90
Downy Brome	55	10	0	0	70	40	0	45	0	30	40	0	0	10	50	20
Duck salad	30	0	0	20	75	25	70	-	40	35	0	0	0	35	0	0
Giant foxtail	95	90	45	30	70	85	60	80	85	70	60	25	50	50	80	90
Italn. Rygrass	40	25	10	0	30	0	0	35	0	0	0	0	0	0	30	40
Johnsongrass	100	75	70	40	90	90	50	75	60	70	40	0	30	70	80	90
Lambsquarter	95	100	95	90	90	95	90	90	90	80	55	55	70	80	90	60
Morningglory	90	90	85	90	90	80	90	90	90	85	90	10	80	50	60	60
Rape	25	80	70	30	80	10	-	30	0	0	80	0	20	50	90	20
Redroot Pigweed	90	90	80	75	90	70	85	80	80	75	60	65	50	80	80	80
Rice Japonica	40	25	25	10	0	25	20	-	20	10	0	0	0	20	0	0
Soybean	90	70	70	80	80	80	85	90	25	40	80	35	30	80	70	80
Speedwell	95	95	100	80	-	80	80	90	95	80	80	-		80	-	-
Sugar beet	100	100	100	100	-	95	100	100	95			-	-		100	-
Umbrella sedge	20	0	0	30	50	80	80	-	40	0	0	0	15	15	15	0

Velvetleaf	100	100	100	90	90	90	95	100	95	90	90	80	80	80	100	90				
Watergrass 2	30	25	30	-	-	-	-	-	-	-	-	-	-	0	20	60	65			
Wheat	30	25	20	10	50	85	20	50	0	0	10	0	0	0	30	30	20			
Wild buckwheat	85	65	60	30	40	75	30	75	70	0	0	0	0	0	50	90	90			
Wild oat	90	65	25	25	70	95	65	80	70	30	50	0	0	0						

Table A

Rate 16 g/ha	COMPOUND															
PREEMERGENCE	1	2	3	4	5	6	12	14	16	18	24	25	26	27	30	31
Barley Igri	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
Barnyardgrass	60	0	0	0	30	10	0	10	0	0	0	0	0	0	0	0
Bedstraw	0	0	0	-	10	0		0	0	0	0	0	0	50	0	0
Blackgrass	0	0	0	-	0	10	0	10	0	0	0	0	0	0	0	30
Chickweed	20	0	30	-	0	10	95	100	30	40	0	0	30	0	-	100
Cocklebur	20	0	20	10	0	0	20	20	0	0	0	0	0	0	0	0
Corn	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	0	30	0	0	0	30	-	0	0	10	0	0	0	0	0	0
Crabgrass	60	80	100	20	75	80	40	75	30	80	0	0	0	20	20	
Downy Brome	0	0	0	-	0	0	95	30	0	0	0	0	0	0	0	0
Giant foxtail	20	10	0	0	10	20	10	15	0	0	0	0	0	10	0	25
Italn. Rygrass	0	0	10	-	0	0	0	0	0	0	0	0	0	0	0	0
Johnsongrass	20	0	40	0	0	10	0	-	0	0	0	0	0	0	0	10
Lambsquarter	70	95	100	-	95	100	100	100	90	60	10	0	40	-	0	10
Morningglory	20	0	0	0	0	0	0	0	20	0	0	0	0	0	20	10
Rape	0	0	0		0	0	-	-	0	0	0	0	0	0	0	0
Redroot Pigweed	40	30	70	0	40	-		-	0	20	0	0	0	40	50	30
Soybean	30	0	0	0	0	10	20	0	0	0	0	0	0	0	0	0
Speedwell	100	100	90	-	-	100	100	100	80	70	0	0	0	0	95	70
Sugar beet	25	0	10	-	-	-	90	55	0	-	-	-	-	-	0	-
Velvetleaf	85	90	85	20	100	100	90	100	40	70	20	0	0	70	0	80
Wheat	0	0	0	-	0	30	0	30	0	0	0	0	0	0	0	0
Wild buckwheat	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
Wild oat	0	0	10	-	0	25	0	25	0	0	0	0	0	0	0	0

Table A	COMPOUND												
Rate 8 g/ha	1	2	4	5	6	12	14	16	18	24	27	30	31
POSTEMERGENCE													
Barley Igri	35	0	0	30	50	40	10	0	0	0	0	0	10
Barnyard 2	35	40	10	10	0	10	-	15	0	0	10	0	0
Barnyardgrass	95	90	90	90	95	95	90	90	90	90	95	95	95
Bedstraw	60	0	50	90	40	10	30	80	80	60	50	40	50
Blackgrass	60	10	0	60	80	0	40	10	20	30	20	30	40
Chickweed	95	90	70	90	80	75	90	75	-	90	-	80	-
Cocklebur	100	90	70	90	90	85	85	90	90	85	90	90	60
Corn	55	0	0	0	0	0	0	15	5	0	15	0	0
Cotton	100	90	85	60	90	95	90	70	40	70	70	80	50
Crabgrass	90	85	70	90	85	60	75	80	85	60	80	85	80
Downy Brome	40	0	0	70	30	0	35	0	20	10	0	30	20
Duck salad	30	0	10	0	10	0	-	10	0	0	0	0	0
Giant foxtail	90	85	20	70	75	40	55	75	40	35	40	75	80
Italn. Rygrass	30	10	0	20	0	0	20	0	0	0	0	20	0
Johnsongrass	95	65	30	70	85	35	70	40	35	20	70	80	85
Lambsquarter	85	95	90	90	95	85	85	80	80	20	70	60	50
Morningglory	90	90	30	90	80	85	90	40	15	90	40	40	50
Rape	10	75	10	80	0	-	30	0	0	30	30	70	10
Redroot Pigweed	90	90	65	85	60	80	80	70	-	50	80	55	70
Rice Japonica	35	10	10	0	10	0	-	15	0	0	10	0	0
Soybean	90	70	70	75	80	70	85	40	15	70	75	70	70
Speedwell	90	70	80	60	80	70	85	60	70	70	70	0	80
Sugar beet	100	100	90	-	90	95	100	-	-	-	-	100	-
Umbrella sedge	20	0	20	0	20	60	-	20	0	0	0	0	0
Velvetleaf	100	100	70	90	90	95	95	90	80	85	80	90	90
Watergrass 2	25	10	0	-	-	-	-	-	-	-	-	-	-
Wheat	10	0	0	35	80	0	35	0	0	0	10	10	15
Wild buckwheat	60	65	30	30	50	30	35	40	0	0	20	20	0
Wild oat	90	25	10	55	90	20	70	0	10	35	30	70	50

Table A	COMPOUND												
Rate 8 g/ha	1	2	4	5	6	12	14	16	18	24	27	30	31
PREEMERGENCE													
Barley lgri	0	0	-	0	0	0	0	0	0	0	0	0	0
Barnyardgrass	20	0	0	0	0	0	0	0	0	0	0	0	0
Bedstraw	0	0	-	0	0	0	0	10	0	0	0	0	0
Blackgrass	0	0	-	0	10	0	10	0	0	0	0	0	20
Chickweed	0	0	-	0	-	-	95	0	-	0	-	25	70
Cocklebur	10	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	0	0	0	0	10	20	-	0	10	0	0	0	0
Crabgrass	20	20	0	30	50	10	30	60	40	0	10	0	40
Downy Brome	0	0	-	0	0	95	30	0	0	0	0	0	0
Giant foxtail	10	0	0	10	10	0	0	0	0	0	0	0	15
Italn. Rygrass	0	0	-	0	0	0	0	0	0	0	0	0	0
Johnsongrass	10	0	0	0	0	0	0	0	0	0	0	0	0
Lambsquarter	50	90	-	70	100	0	100	80	60	0	0	0	0
Morningglory	0	0	0	0	0	0	0	0	0	0	0	0	0
Rape	0	0	-	0	-	0	-	0	0	0	0	0	0
Redroot Pigweed	20	0	0	20	-	-	-	50	0	0	20	0	0
Soybean	10	0	0	0	-	20	0	0	0	0	0	0	0
Speedwell	90	0	-	-	100	100	100	0	50	-	0	-	0
Sugar beet	0	0	-	-	20	90	35	-	-		-	0	-
Velvetleaf	40	20	0	80	80	50	60	65	40	0	60	0	60
Wheat	0	0	-	0	30	0	30	0	0	0	0	0	0
Wild buckwheat	0	0	-	0	0	-	0	0	0	0	0	0	0
Wild oat	0	0	-	0	25	0	25	0	0	0	0	0	0

Table A	COMPOUND							
Rate 4 g/ha	1	2	5	6	16	27	30	31
POSTEMERGENCE								
Barley Igri	0	0	0	30	0	0	0	0
Barnyard 2	30	25	0	0	10	0	0	0
Barnyardgrass	90	90	90	95	90	90	95	90
Bedstraw	45	0	50	35	60	-	40	50
Blackgrass	35	0	20	65	0	0	10	30
Chickweed	85	75	80	45	-	-	60	-
Cocklebur	90	90	80	80	80	80	80	60
Corn	20	0	0	0	10	10	0	0
Cotton	90	90	60	80	70	70	40	50
Crabgrass	90	80	75	85	80	60	60	70
Downy Brome	30	0	20	0	0	0	10	10
Duck salad	20	0	0	0	0	0	0	0
Giant foxtail	90	65	40	50	50	10	50	70
Italn. Rygrass	10	0	15	0	0	0	0	0
Johnsongrass	95	60	50	65	30	40	60	70
Lambsquarter	80	75	80	90	70	50	55	15
Morningglory	90	90	90	30	40	40	10	25
Rape	0	30	50	0	0	20	40	0
Redroot Pigweed	60	90	80	45	40	70	50	70
Rice Japonica	20	0	0	0	15	10	0	0
Soybean	85	45	70	70	40	75	40	50
Speedwell	85	70	-	60	30	70	0	60
Sugar beet	100	100	-	60	-	-	90	-
Umbrella sedge	10	0	0	0	10	0	0	0
Velvetleaf	100	100	90	90	90	80	90	90
Watergrass 2	20	10	-	-	-	-	-	-
Wheat	0	0	10	35	0	0	0	0
Wild buckwheat	25	20	10	30	0	0	10	-
Wild oat	65	0	30	70	0	10	20	35

Table A

Rate 4 g/ha	COMPOUND 1	2	5	6	16	27	30	31
PREEMERGENCE								
Barley Igri	0	0	0	0	0	0	0	0
Barnyardgrass	0	0	0	0	0	0	0	0
Bedstraw	0	0	0	0	0	0	0	0
Blackgrass	0	0	0	0	0	0	0	0
Chickweed	0	0	0	-	0	0	25	0
Cocklebur	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0
Cotton	0	0	0	0	0	0	0	0
Crabgrass	0	10	10	20	30	0	0	0
Downy Brome	0	0	0	0	0	0	0	0
Giant foxtail	0	0	0	0	0	0	0	10
Italn. Rygrass	0	0	0	0	0	0	0	0
Johnsongrass	0	0	0	0	0	0	0	0
Lambsquarter	20	70	0	100	50	0	0	0
Morningglory	0	0	0	0	0	0	0	0
Rape	0	0	0	0	0	0	0	0
Redroot Pigweed	0	0	10		30	0	0	0
Soybean	0	0	0	0	0	0	0	0
Speedwell	20	0	-	30	0	0	95	-
Sugar beet	0	0	-	20	-	-	0	-
Velvetleaf	20	0	40	0	50	40	0	20
Wheat	0	0	0	30	0	0	0	0
Wild buckwheat	0	0	0	0	0	0	0	0
Wild oat	0	0	0	25	0	0	0	0

Table A	COMPOUND
Rate 2 g/ha	1
POSTEMERGENCE	
Barley Igri	0
Barnyard 2	30
Barnyardgrass	90
Bedstraw	10
Blackgrass	30
Chickweed	70
Cocklebur	80
Corn	0
Cotton	80
Crabgrass	80
Downy Brome	10
Duck salad	20
Giant foxtail	80
Italn. Rygrass	0
Johnsongrass	70
Lambsquarter	40
Morningglory	70
Rape	0
Redroot Pigweed	60
Rice Japonica	10
Soybean	85
Speedwell	35
Sugar beet	95
Umbrella sedge	0
Velvetleaf	100
Watergrass 2	20
Wheat	0
Wild buckwheat	0
Wild oat	40

Table A	COMPOUND
Rate 2 g/ha	1
PREEMERGENCE	
Barley Igri	0
Barnyardgrass	0
Bedstraw	0
Blackgrass	0
Chickweed	0
Cocklebur	0
Corn	0
Cotton	0
Crabgrass	0
Downy Brome	0
Giant foxtail	0
Italn. Rygrass	0
Johnsongrass	0
Lambsquarter	20
Morningglory	0
Rape	0
Redroot Pigweed	0
Soybean	0
Speedwell	20
Sugar beet	0
Velvetleaf	0
Wheat	0
Wild buckwheat	0
Wild oat	0

Table A	COMPOUND
Rate 1 g/ha	1
POSTEMERGENCE	
Barley Igri	0
Barnyard 2	30
Barnyardgrass	90
Bedstraw	0
Blackgrass	10
Chickweed	60
Cocklebur	80
Corn	0
Cotton	50
Crabgrass	70
Downy Brome	0
Duck salad	0
Giant foxtail	60
Italn. Rygrass	0
Johnsongrass	50
Lambsquarter	20
Morningglory	40
Rape	0
Redroot Pigweed	30
Rice Japonica	10
Soybean	70
Speedwell	30
Sugar beet	95
Umbrella sedge	0
Velvetleaf	90
Watergrass 2	20
Wheat	0
Wild buckwheat	0
Wild oat	35

Table A	COMPOUND
Rate 1 g/ha	1
PREEMERGENCE	
Barley Igri	0
Barnyardgrass	0
Bedstraw	0
Blackgrass	0
Chickweed	0
Cocklebur	0
Corn	0
Cotton	0
Crabgrass	0
Downy Brome	0
Giant foxtail	0
Italn. Rygrass	0
Johnsongrass	0
Lambsquarter	10
Morningglory	0
Rape	0
Redroot Pigweed	0
Soybean	0
Speedwell	10
Sugar beet	0
Velvetleaf	0
Wheat	0
Wild buckwheat	0
Wild oat	0

TEST B

Compounds evaluated in this test were formulated in a non-phytotoxic solvent mixture which included a surfactant and applied to the soil surface before plant seedlings emerged (preemergence application) and to plants that were grown for various periods of time before treatment (postemergence application). A sandy loam soil was used for the preemergence test while a mixture of sandy loam soil and greenhouse potting mix in a 60:40 ratio was used for the postemergence test. Test compounds were applied within approximately one day after planting seeds for the preemergence test, and 13 days after the last postemergence planting.

Plantings of these crops and weed species were adjusted to produce plants of appropriate size for the postemergence test. All plant species were grown using normal greenhouse practices. Crop and weed species include alexandergrass (*Brachiaria plantaginea*), american black nightshade (*Solanum americanum*), apple-of-Peru (*Nicandra physaloides*), arrowleaf sida (*Sida rhombifolia*), brazilian sicklepod (*Cassia tora Brazilian*), brazilian signalgrass (*Brachiaria decumbens*), capim-colchao (*Digitaria horizontalis*), cristalina soybean (*Glycine max Cristalina*), florida beggarweed (*Desmodium purpureum*), hairy beggarticks (*Bidens pilosa*), slender amaranth (*Amaranthus viridis*), southern sandur (*Cenchrus echinatus*), tall morningglory (*Ipomoea purpurea*), tropical spiderwort (*Commelina benghalensis*), W20 Soybean (Glycine max W20), W4-4 Soybean (Glycine max W4-4) and wild pointsettia (*Eupohorbia heterophylla*).

Treated plants and untreated controls were maintained in a greenhouse for approximately 13 days, after which all treated plants were compared to untreated controls and visually evaluated. Plant response ratings, summarized in Table B, are based upon a 0 to 100 scale where 0 is no effect and 100 is complete control. A dash response (-) means no test result.

Table B	COMPOUND		
Rate 280 g/ha	1	2	4
POSTEMERGENCE			
Acanthospermum	100	100	100
Alexandergrass	100	100	100
Apple-of-Peru	100	100	100
Arrowleaf Sida	80	85	100
B. Signalgrass	100	90	100
Bl. Nightshade	100	100	100
Braz Sicklepod	60	65	100
Capim-Colch	100	100	100
Crist. Soybean	95	85	90
Fl. Beggarweed	100	100	100
H. Beggarticks	95	100	100
Morningglory	100	90	75
Sl. Amaranth	100	100	80
Tr. Spiderwort	100	100	100
Wld Pointsettia	100	100	100
W20 Soybean	85	80	90
W4-4 Soybean	95	80	100

Table B	COMPOUND		
Rate 140 g/ha	1	2	4
POSTEMERGENCE			
Acanthospermum	100	90	100
Alexandergrass	100	100	100
Apple-of-Peru	100	100	100
Arrowleaf Sida	70	80	100
B. Signalgrass	100	95	100
Bl. Nightshade	100	100	100
Braz Sicklepod	55	40	50
Capim-Colch	100	85	100
Crist. Soybean	100	95	90
Fl. Beggarweed	100	100	-
H. Beggarticks	80	80	100
Morningglory	100	100	100
Sl. Amaranth	100	85	80
Tr. Spiderwort	85	70	90
Wld Pointsettia	100	100	100
W20 Soybean	90	85	90
W4-4 Soybean	95	85	100

Table B	COMPOUND		
Rate 70 g/ha	1	2	4
POSTEMERGENCE			
Acanthospermum	100	90	100
Alexandergrass	100	100	85
Apple-of-Peru	100	100	80
Arrowleaf Sida	65	75	100
B. Signalgrass	90	90	70
Bl. Nightshade	100	100	100
Braz Sicklepod	50	30	40
Capim-Colch	90	75	100
Crist. Soybean	100	90	80
Fl. Beggarweed	100	80	-
H. Beggarticks	75	70	80
Morningglory	100	85	100
Sl. Amaranth	75	80	70
Tr. Spiderwort	50	65	85
Wld Pointsettia	100	100	100
W20 Soybean	90	85	85
W4-4 Soybean	90	85	90

Table B	COMPOUND		
Rate 35 g/ha	1	2	4
POSTEMERGENCE			
Acanthospermum	100	80	100
Alexandergrass	100	95	75
Apple-of-Peru	70	100	70
Arrowleaf Sida	60	65	100
B. Signalgrass	90	80	70
Bl. Nightshade	100	100	100
Braz Sicklepod	15	15	30
Capim-Colch	80	65	80
Crist. Soybean	100	80	80
Fl. Beggarweed	80	80	-
H. Beggarticks	70	60	80
Morningglory	100	70	85
Sl. Amaranth	75	65	65
Tr. Spiderwort	75	65	60
Wld Pointsettia	100	100	85
W20 Soybean	90	85	85
W4-4 Soybean	90	85	90

Table B	COMPOUND		
Rate 17 g/ha	1	2	4
POSTEMERGENCE			
Acanthospermum	100	70	85
Alexandergrass	100	90	70
Apple-of-Peru	70	100	60
Arrowleaf Sida	60	65	70
B. Signalgrass	85	70	70
Bl. Nightshade	70	85	100
Braz Sicklepod	10	15	15
Capim-Colch	70	40	55
Crist. Soybean	100	75	80
Fl. Beggarweed	80	80	100
H. Beggarticks	65	55	65
Morningglory	80	65	75
Sl. Amaranth	65	65	55
Tr. Spiderwort	60	60	50
Wld Pointsettia	70	85	75
W20 Soybean	85	75	85
W4-4 Soybean	85	75	85

Table B	COMPOUND		
Rate 8 g/ha	1	2	4
POSTEMERGENCE			
Acanthospermum	90	70	80
Alexandergrass	85	80	60
Apple-of-Peru	65	100	40
Arrowleaf Sida	50	65	50
B. Signalgrass	80	60	65
Bl. Nightshade	70	85	80
Braz Sicklepod	0	10	10
Capim-Colch	55	25	25
Crist. Soybean	80	75	55
Fl. Beggarweed	80	70	100
H. Beggarticks	55	50	60
Morningglory	70	65	55
Sl. Amaranth	60	60	50
Tr. Spiderwort	40	40	35
Wld Pointsettia	70	65	50
W20 Soybean	75	70	65
W4-4 Soybean	85	65	65

TEST C

Compounds evaluated in this test were formulated in a non-phytotoxic solvent mixture which included a surfactant and applied to the soil surface before plant seedlings emerged (preemergence application) and to plants that were grown for various periods of time before treatment (postemergence application). A sandy loam soil was used for the preemergence test while a mixture of sandy loam soil and greenhouse potting mix in a 60:40 ratio was used for the postemergence test. Test compounds were applied within approximately one day after planting seeds for the preemergence test.

Plantings of these crops and weed species were adjusted to produce plants of appropriate size for the postemergence test. All plant species were grown using normal greenhouse practices. Crop and weed species include American black nightshade (*Solanum americanum*), arrowleaf sida (*Sida rhombifolia*), barnyardgrass (*Echinochloa crus-galli*), cocklebur (*Xanthium strumarium*), common lambsquarters (*Chenopodium album*), common ragweed (*Ambrosia artemisiifolia*), corn (*Zea mays*), cotton (*Gossypium hirsutum*), eastern black nightshade (*Solanum ptycanthum*), fall panicum (*Panicum dichotomiflorum*), field bindweed (*Convolvulus arvensis*), Florida beggarweed (*Desmodium purpureum*), giant foxtail (*Setaria faberii*), hairy beggarticks (*Bidens pilosa*), ivyleaf morningglory (*Ipomoea hederacea*), johnsongrass (*Sorghum halepense*), ladysthumb (*Polygonum persicaria*), large crabgrass (*Digitaria sanguinalis*), purple nutsedge (*Cyperus rotundus*), redroot pigweed (*Amaranthus retroflexus*), soybean (*Glycine max*), surinam grass (*Brachiaria decumbens*), velvetleaf (*Abutilon theophrasti*) and wild poinsettia (*Euphorbia heterophylla*).

Treated plants and untreated controls were maintained in a greenhouse for approximately 14 to 21 days, after which all treated plants were compared to untreated controls and visually evaluated. Plant response ratings, summarized in Table C, were based upon a 0 to 100 scale where 0 was no effect and 100 was complete control. A dash response (-) means no test result.

Table C	COMPOUND	
Rate 280 g/ha	2	4
POSTEMERGENCE		
Arrowleaw Sida	70	75
Barnyardgrass	100	100
Cocklebur	100	100
Common Ragweed	100	100
Corn	10	10
Cotton	100	100
Estrn Blknight	100	100
Fall Panicum	100	100
Field Bindweed	100	90
Fl Beggarweed	100	100
Giant Foxtail	100	100
Hairy Beggartic	75	70
Ivyleaw Mrnglry	100	100
Johnsongrass	95	80
Ladysthumb	100	100
Lambsquarters	100	100
Large Crabgrass	100	100
Purple Nutsedge	90	75
Redroot Pigweed	100	-
Soybean	100	100
Surinam Grass	100	100
Velvetleaf	100	100
Wild Poinsettia	100	100

Table C	COMPOUND	
Rate 280 g/ha	2	4
PREEMERGENCE		
Arrowleaw Sida	95	100
Barnyardgrass	100	90
Cocklebur	95	55
Common Ragweed	100	100
Corn	0	0
Cotton	100	25
Estrn Blknight	-	-
Fall Panicum	100	100
Field Bindweed	90	90
Fl Beggarweed	100	100
Giant Foxtail	100	100
Hairy Beggartic	100	60
Ivyleaw Mrnglry	55	65
Johnsongrass	75	55
Ladysthumb	100	100
Lambsquarters	-	-
Large Crabgrass	100	100
Purple Nutsedge	80	60
Redroot Pigweed	100	100
Soybean	70	20
Surinam Grass	100	90
Velvetleaf	100	100
Wild Poinsettia	95	90

Table C	COMPOUND				
Rate 140 g/ha	1	2	4	5	6
POSTEMERGENCE					
Arrowleaw Sida	100	50	55	60	90
Barnyardgrass	100	100	95	100	100
Cocklebur	100	100	100	95	100
Common Ragweed	100	100	100	100	100
Corn	0	0	0	45	5
Cotton	100	100	90	95	100
Estrn Blknight	100	100	100	100	100
Fall Panicum	100	95	95	100	100
Field Bindweed	100	95	85	100	90
Fl Beggarweed	100	100	100	100	100
Giant Foxtail	100	100	95	100	100
Hairy Beggartic	85	65	65	95	100
Ivyleaw Mrnglry	80	100	95	100	100
Johnsongrass	100	85	70	100	100
Ladysthumb	100	100	100	100	100
Lambsquarters	100	100	100	95	95
Large Crabgrass	90	95	95	100	100
Purple Nutsedge	85	80	45	20	100
Redroot Pigweed	100	100	-	100	90
Soybean	100	100	100	95	90
Surinam Grass	100	90	90	90	100
Velvetleaf	100	100	100	100	100
Wild Poinsettia	100	100	100	100	100

Table C	COMPOUND		
Rate 140 g/ha	1	2	4
PREEMERGENCE			
Arrowleaw Sida	100	40	45
Barnyardgrass	100	100	25
Cocklebur	90	75	40
Common Ragweed	100	100	95
Corn	0	0	0
Cotton	45	65	10
Estrn Blknight	100	100	-
Fall Panicum	100	100	100
Field Bindweed	60	50	55
Fl Beggarweed	100	100	100
Giant Foxtail	100	95	70
Hairy Beggartic	10	90	35
Ivyleaw Mrnglry	70	30	25
Johnsongrass	90	45	15
Ladysthumb	100	100	100
Lambsquarters	95	100	-
Large Crabgrass	100	100	90
Purple Nutsedge	10	70	25
Redroot Pigweed	100	100	85
Soybean	60	20	0
Surinam Grass	100	80	65
Velvetleaf	100	100	100
Wild Poinsettia	100	45	30

Table C	COMPOUND							
Rate 70 g/ha	1	2	3	4	5	6	16	31
POSTEMERGENCE								
Arrowleaw Sida	100	50	85	70	60	85	65	-
Barnyardgrass	100	95	95	95	95	100	100	95
Cocklebur	95	100	85	95	95	95	95	60
Common Ragweed	100	100	100	100	100	100	100	95
Corn	0	10	10	0	30	5	60	0
Cotton	100	95	85	90	95	100	95	95
Estrn Blknight	100	100	100	95	100	100	100	100
Fall Panicum	100	95	80	100	100	100	95	95
Field Bindweed	90	100	85	65	80	60	60	50
Fl Beggarweed	100	100	100	100	100	100	100	95
Giant Foxtail	95	95	50	80	100	100	95	90
Hairy Beggartic	70	65	75	60	85	85	80	90
Ivyleaw Mrngiry	80	100	90	95	95	100	15	80
Johnsongrass	95	100	25	60	95	100	65	95
Ladysthumb	100	100	95	100	100	100	100	100
Lambsquarters	100	100	100	100	95	95	100	100
Large Crabgrass	90	95	80	80	100	100	95	90
Purple Nutsedge	80	80	0	25	20	95	95	75
Redroot Pigweed	100	100	100	95	100	90	100	100
Soybean	100	100	95	95	90	85	60	80
Surinam Grass	95	95	80	65	90	100	90	90
Velvetleaf	100	100	100	90	100	100	100	100
Wild Poinsettia	100	95	100	100	85	90	65	80

Table C	COMPOUND			
Rate 70 g/ha	1	2	3	4
PREEMERGENCE				
Arrowleaw Sida	80	50	0	15
Barnyardgrass	100	95	35	15
Cocklebur	90	10	0	0
Common Ragweed	95	100	95	55
Corn	0	0	0	0
Cotton	20	0	10	10
Estrn Blknight	100	100	-	100
Fall Panicum	100	100	75	85
Field Bindweed	50	30	10	0
Fl Beggarweed	95	85	-	100
Giant Foxtail	100	35	10	20
Hairy Beggartic	0	25	10	20
Ivyleaw Mrnglry	20	0	0	0
Johnsongrass	40	25	25	10
Ladysthumb	90	65	-	50
Lambsquarters	95	95	-	95
Large Crabgrass	100	100	100	100
Purple Nutsedge	5	60	0	0
Redroot Pigweed	90	80	55	35
Soybean	55	15	0	0
Surinam Grass	100	70	60	10
Velvetleaf	100	100	100	95
Wild Poinsettia	80	35	20	15

Table C	COMPOUND									
Rate 35 g/ha	1	2	3	4	5	6	16	18	30	31
POSTEMERGENCE										
Arrowleaw Sida	80	90	70	45	60	50	20	70	70	65
Barnyardgrass	100	100	95	90	85	100	95	90	100	95
Cocklebur	90	100	80	95	90	95	95	80	95	60
Common Ragweed	100	100	100	90	100	100	100	100	95	95
Corn	0	20	15	0	20	0	20	35	5	0
Cotton	100	100	75	80	85	100	95	90	95	90
Estrn Biknight	100	100	95	85	100	95	100	85	100	100
Fall Panicum	90	100	75	95	100	100	100	90	100	95
Field Bindweed	90	80	80	50	80	60	50	65	5	50
Fl Beggarweed	90	100	95	100	90	50	95	100	100	100
Giant Foxtail	80	95	40	65	85	100	100	85	100	90
Hairy Beggartic	70	70	60	40	60	80	70	70	70	80
Ivyleaw Mrnglry	70	95	80	95	90	80	40	60	60	65
Johnsongrass	80	90	20	60	70	100	20	70	100	85
Ladysthumb	100	100	95	90	100	100	100	100	100	100
Lambsquarters	95	100	95	100	95	95	90	80	100	95
Large Crabgrass	85	95	75	70	85	100	100	100	100	90
Purple Nutsedge	30	85	0	25	20	30	90	75	75	-
Redroot Pigweed	95	100	95	90	80	90	95	80	100	100
Soybean	85	100	95	95	95	80	40	65	95	75
Surinam Grass	90	95	70	65	90	95	90	75	20	85
Velvetleaf	100	100	95	90	100	100	100	100	100	100
Wild Poinsettia	90	100	95	90	95	85	20	65	80	75

Table C	COMPOUND			
Rate 35 g/ha	1	2	3	4
PREEMERGENCE				
Arrowleaw Sida	80	25	0	0
Barnyardgrass	20	15	10	0
Cocklebur	20	55	0	0
Common Ragweed	90	75	35	20
Corn	0	0	0	0
Cotton	5	100	0	0
Estrn Blknight	100	95	-	95
Fall Panicum	100	100	15	75
Field Bindweed	50	30	0	0
Fl Beggarweed	-	50	25	15
Giant Foxtail	100	15	0	0
Hairy Beggartic	0	35	0	0
Ivyleaw Mrnglry	0	0	0	0
Johnsongrass	10	0	0	0
Ladysthumb	-	30	-	30
Lambsquarters	0	95	-	75
Large Crabgrass	-	95	70	35
Purple Nutsedge	0	25	0	0
Redroot Pigweed	50	70	-	15
Soybean	40	0	0	0
Surinam Grass	95	45	10	0
Velvetleaf	100	100	100	70
Wild Poinsettia	50	25	0	0

Table C	COMPOUND									
Rate 17 g/ha	1	2	3	4	5	6	16	18	30	31
POSTEMERGENCE										
Arrowleaw Sida	50	60	65	35	10	50	20	70	20	80
Barnyardgrass	100	95	90	90	70	100	95	90	100	90
Cocklebur	90	100	70	90	90	90	85	85	85	50
Common Ragweed	100	100	100	95	85	90	100	80	95	90
Corn	0	0	0	0	5	0	20	25	5	0
Cotton	100	100	70	70	60	90	90	80	90	75
Estrn Blknight	95	100	95	80	95	90	100	80	100	100
Fall Panicum	70	85	45	40	85	100	100	85	95	85
Field Bindweed	80	65	65	45	80	60	20	55	5	25
Fl Beggarweed	85	100	75	60	85	50	80	90	100	100
Giant Foxtail	65	80	25	45	80	90	100	80	95	80
Hairy Beggartic	50	65	40	30	60	10	30	60	60	65
Ivyleaw Mrnglry	70	95	60	80	80	80	40	45	60	55
Johnsongrass	50	80	15	15	70	80	5	60	95	80
Ladysthumb	90	55	85	75	100	95	100	90	100	100
Lambsquarters	80	100	80	85	95	80	90	80	100	100
Large Crabgrass	85	85	45	55	60	100	90	90	100	85
Purple Nutsedge	5	60	0	15	5	30	50	45	20	-
Redroot Pigweed	80	95	80	90	75	80	90	80	100	95
Soybean	85	100	85	85	90	70	35	35	85	70
Surinam Grass	90	80	45	60	60	80	80	70	5	70
Velvetleaf	100	100	95	95	100	100	100	100	100	95
Wild Poinsettia	70	95	85	90	80	80	5	50	60	65

Table C	COMPOUND			
Rate 17 g/ha	1	2	3	4
PREEMERGENCE				
Arrowleaw Sida	50	15	0	0
Barnyardgrass	10	10	0	0
Cocklebur	20	20	0	0
Common Ragweed	20	55	0	0
Corn	0	0	0	0
Cotton	0	15	0	0
Estrn Blknight	0	60	-	20
Fall Panicum	50	65	0	15
Field Bindweed	20	0	0	0
Fl Beggarweed	0	15	0	0
Giant Foxtail	0	0	0	0
Hairy Beggartic	0	15	0	0
Ivyleaw Mrnglry	0	0	0	0
Johnsongrass	5	0	0	0
Ladysthumb	-	30	-	0
Lambsquarters	0	45	-	35
Large Crabgrass	100	15	35	0
Purple Nutsedge	0	0	0	0
Redroot Pigweed	0	20	-	10
Soybean	0	0	0	0
Surinam Grass	10	0	0	0
Velvetleaf	100	35	35	35
Wild Poinsettia	45	10	0	0

Table C	COMPOUND									
Rate 8 g/ha	1	2	3	4	5	6	16	18	30	31
POSTEMERGENCE										
Arrowleaw Sida	50	45	55	15	5	10	10	65	-	35
Barnyardgrass	100	90	85	85	65	100	90	90	95	90
Cocklebur	80	100	65	50	80	85	85	75	80	20
Common Ragweed	95	95	95	75	50	90	100	80	80	90
Corn	0	10	0	0	0	0	5	15	0	0
Cotton	100	95	30	35	50	80	80	70	70	70
Estrn Biknight	95	100	90	75	85	90	100	75	100	100
Fall Panicum	50	80	25	25	60	70	95	80	90	85
Field Bindweed	70	35	30	35	10	60	10	50	5	10
Fl Beggarweed	70	100	65	60	80	50	80	85	80	85
Giant Foxtail	60	70	10	20	70	80	70	75	90	80
Hairy Beggartic	50	50	30	20	55	0	30	55	40	50
Ivyleaw Mrnglry	70	70	45	80	70	65	25	35	5	10
Johnsongrass	30	50	10	20	60	55	5	55	65	40
Ladysthumb	90	40	75	65	10	90	100	75	70	10
Lambsquarters	70	95	75	75	90	40	90	75	80	65
Large Crabgrass	80	80	35	50	60	85	95	85	90	75
Purple Nutsedge	0	0	0	5	0	10	5	25	15	20
Redroot Pigweed	85	95	75	65	70	70	80	80	80	85
Soybean	80	100	75	60	70	60	20	20	80	45
Surinam Grass	80	65	25	40	40	45	70	65	0	20
Velvetleaf	100	100	85	75	100	100	85	85	95	95
Wild Poinsettia	50	85	70	60	70	70	0	30	15	50

Table C	COMPOUND			
Rate 8 g/ha	1	2	3	4
PREEMERGENCE				
Arrowleaw Sida	50	0	0	0
Barnyardgrass	0	0	0	0
Cocklebur	0	10	0	0
Common Ragweed	0	50	0	0
Corn	0	0	0	0
Cotton	0	0	0	0
Estrn Biknight	0	45	-	-
Fall Panicum	0	20	0	0
Field Bindweed	0	0	0	0
Fl Beggarweed	0	0	0	0
Giant Foxtail	0	0	0	0
Hairy Beggartic	0	0	0	0
Ivyleaw Mrnglry	0	0	0	0
Johnsongrass	0	0	0	0
Ladysthumb	0	0		0
Lambsquarters	0	30	-	10
Large Crabgrass	80	0	0	0
Purple Nutsedge	0	0	0	0
Redroot Pigweed	0	0	-	0
Soybean	0	0	0	0
Surinam Grass	0	0	0	0
Velvetleaf	70	15	10	20
Wild Poinsettia	0	10	0	0

Table C	COMPOUND						
Rate 4 g/ha	2	3	4	16	18	30	31
POSTEMERGENCE							
Arrowleaw Sida	35	45	15	5	55	5	35
Barnyardgrass	90	30	55	90	85	95	85
Cocklebur	95	30	45	70	65	70	10
Common Ragweed	90	85	65	95	55	0	60
Corn	0	0	0	0	10	0	0
Cotton	60	15	25	70	60	65	35
Estrn Blknight	80	75	65	100	70	95	100
Fall Panicum	60	10	20	90	70	80	40
Field Bindweed	25	20	10	5	30	0	10
Fl Beggarweed	100	50	25	75	70	75	100
Giant Foxtail	55	0	15	65	65	70	50
Hairy Beggartic	25	20	10	10	50	30	25
Ivyleaw Mrnglry	60	25	70	0	20	5	0
Johnsongrass	35	0	0	0	50	10	10
Ladysthumb	25	60	25	100	45	70	10
Lambsquarters	85	70	60	75	70	40	50
Large Crabgrass	55	25	20	90	75	85	65
Purple Nutsedge	0	0	0	5	20	10	50
Redroot Pigweed	75	70	60	80	75	60	65
Soybean	90	60	60	15	15	70	15
Surinam Grass	55	15	20	40	55	0	20
Velvetleaf	100	60	60	70	75	90	75
Wild Poinsettia	75	45	30	0	20	15	40

Table C	COMPOUND		
Rate 4 g/ha	2	3	4
PREEMERGENCE			
Arrowleaw Sida	0	0	0
Barnyardgrass	0	0	0
Cocklebur	0	0	0
Common Ragweed	25	0	0
Corn	0	0	0
Cotton	0	0	0
Estrn Blknight	0	-	0
Fall Panicum	0	0	0
Field Bindweed	-	0	0
Fl Beggarweed	0	0	0
Giant Foxtail	0	0	0
Hairy Beggartic	0	0	0
Ivyleaw Mrnglry	0	0	0
Johnsongrass	0	0	0
Ladysthumb	0	-	0
Lambsquarters	0	-	0
Large Crabgrass	0	0	0
Purple Nutsedge	0	0	0
Redroot Pigweed	0	25	0
Soybean	0	0	0
Surinam Grass	0	0	0
Velvetleaf	10	0	0
Wild Poinsettia	0	0	0

Table C	COMPOUND	
Rate 2 g/ha	2	4
POSTEMERGENCE		
Arrowleaw Sida	25	10
Barnyardgrass	75	25
Cocklebur	80	0
Common Ragweed	85	60
Corn	0	0
Cotton	25	15
Estrn Blknight	75	60
Fall Panicum	15	15
Field Bindweed	20	5
Fl Beggarweed	100	50
Giant Foxtail	15	0
Hairy Beggartic	15	10
Ivyleaw Mrnglry	40	10
Johnsongrass	0	0
Ladysthumb	10	10
Lambsquarters	85	60
Large Crabgrass	45	10
Purple Nutsedge	0	0
Redroot Pigweed	70	45
Soybean	70	20
Surinam Grass	30	0
Velvetleaf	95	15
Wild Poinsettia	50	20

Table C	COMPOUND	
Rate 2 g/ha	2	4
PREEMERGENCE		
Arrowleaw Sida	0	0
Barnyardgrass	0	0
Cocklebur	0	0
Common Ragweed	0	0
Corn	0	0
Cotton	0	0
Estrn Blknight	0	0
Fall Panicum	0	0
Field Bindweed	0	0
Fl Beggarweed	0	0
Giant Foxtail	0	0
Hairy Beggartic	0	0
Ivyleaw Mrnglry	0	0
Johnsongrass	0	0
Ladysthumb	0	-
Lambsquarters	0	0
Large Crabgrass	0	0
Purple Nutsedge	0	0
Redroot Pigweed	0	0
Soybean	0	0
Surinam Grass	0	0
Velvetleaf	0	0
Wild Poinsettia	0	0

TEST D

Seeds of barnyardgrass (*Echinochloa crus-galli*), bindweed (*Concolculus arvensis*), black nightshade (*Solanum ptycanthum dunal*), cassia (*Cassia obtusifolia*), cocklebur (*Xanthium strumarium*), common ragweed (*Ambrosia artemisiifolia*), corn (*Zea mays*), cotton (*Gossypium hirsutam*), crabgrass (*Digitaria spp.*), fall panicum (*Panicum dichotomi- florum*), giant foxtail (*Setaria faberii*), green foxtail (*Setaria viridis*), jimsonweed (*Datura stramonium*), johnsongrass (*Sorghum halepense*), lambsquarter (*Chenopodium album*), morningglory (*Ipomoea spp.*), pigweed (*Amaranthus retroflexus*), prickly sida (*Sida spinosa*), shattercane (*Sorghum vulgare*), signalgrass (*Brachiaria platyphylla*), smartweed (*Polygonum pensylvanicum*), soybean (*Glycine max*), sunflower (*Helianthus annuus*), velvetleaf (*Abutilon theophrasti*), wild proso (*Pancium miliaceum*), woolly cupgrass (*Eriochloa villosa*), yellow foxtail (*Setaria lutescens*) and purple nutsedge (*Cyperus rotundus*) tubers were planted into a sandy loam or clay loam soil. These crops and weeds were grown in the greenhouse until the plants ranged in height from two to eighteen cm (one to four leaf stage), then treated postemergence with the test chemicals formulated in a non-phytotoxic solvent mixture which included a surfactant. Pots receiving preemergence treatments were planted immediatley prior to test chemical application. Pots treated in this fashion were placed in the greenhouse and maintained according to routine greenhouse procedures.

Treated plants and untreated controls were maintained in the greenhouse approximately 14-21 days after application of the test compound. Visual evaluations of plant injury responses were then recorded. Plant response ratings, summarized in Table D, are reported on a 0 to 100 scale where 0 is no effect and 100 is complete control.

Table D	COMPOUND		
Rate 280 g/ha	1	2	4
POSTEMERGENCE			
Barnyardgrass	100	100	100
Bindweed	95	95	100
Blk Nightshade	100	100	100
Cassia	60	20	10
Cocklebur	100	100	100
Corn	10	35	20
Cotton	90	90	100
Crabgrass	95	95	100
Fall Panicum	100	95	100
Giant Foxtail	95	95	100
Green Foxtail	95	95	100
Jimsonweed	100	100	100
Johnson Grass	95	95	100
Lambsquarter	95	95	100
Morningglory	100	100	100
Nutsedge	95	95	80
Pigweed	100	95	100
Prickly Sida	80	50	80
Ragweed	100	100	100
Shattercane	100	100	100
Signalgrass	95	100	100
Smartweed	100	100	100
Soybean	90	90	100
Sunflower	100	100	100
Velvetleaf	100	100	100
Wild Proso	95	95	100
Woolly cupgrass	95	95	80
Yellow Foxtail	95	95	100

Table D	COMPOUND		
Rate 140 g/ha	1	2	4
POSTEMERGENCE			
Barnyardgrass	100	100	100
Bindweed	95	100	100
Blk Nightshade	100	100	100
Cassia	50	5	10
Cocklebur	100	100	100
Corn	5	20	20
Cotton	90	100	100
Crabgrass	95	100	100
Fall Panicum	95	100	100
Giant Foxtail	95	100	100
Green Foxtail	95	100	100
Jimsonweed	100	100	100
Johnson Grass	95	100	100
Lambsquarter	95	100	100
Morningglory	100	90	100
Nutsedge	95	100	60
Pigweed	100	100	90
Prickly Sida	80	50	50
Ragweed	100	100	100
Shattercane	100	100	100
Signalgrass	95	100	100
Smartweed	100	100	100
Soybean	90	100	100
Sunflower	100	100	100
Velvetleaf	100	100	100
Wild Proso	95	100	100
Woolly cupgrass	95	100	80
Yellow Foxtail	95	100	100

Table D	COMPOUND			
Rate 70 g/ha	1	2	4	28
POSTEMERGENCE				
Barnyardgrass	100	100	100	90
Bindweed	90	100	100	60
Blk Nightshade	100	100	100	100
Cassia	5	5	5	0
Cocklebur	100	100	100	50
Corn	5	50	15	0
Cotton	90	100	100	50
Crabgrass	95	100	100	70
Fall Panicum	95	100	100	20
Giant Foxtail	95	100	95	0
Green Foxtail	95	100	100	0
Jimsonweed	100	100	100	100
Johnson Grass	90	100	80	10
Lambsquarter	90	100	100	100
Morningglory	100	100	100	90
Nutsedge	95	100	30	10
Pigweed	100	100	80	60
Prickly Sida	50	60	20	0
Ragweed	100	100	100	40
Shattercane	100	100	100	0
Signalgrass	95	100	100	-
Smartweed	100	100	100	90
Soybean	90	100	95	70
Sunflower	100	100	100	30
Velvetleaf	100	100	100	90
Wild Proso	95	100	90	20
Woolly cupgrass	90	90	70	5
Yellow Foxtail	95	100	100	0

Table D	COMPOUND			
Rate 35 g/ha	1	2	4	28
POSTEMERGENCE				
Barnyardgrass	95	100	100	50
Bindweed	90	95	90	50
Blk Nightshade	100	100	100	90
Cassia	5	0	5	0
Cocklebur	100	100	95	40
Corn	0	30	15	0
Cotton	90	100	100	50
Crabgrass	90	90	100	50
Fall Panicum	95	100	80	5
Giant Foxtail	90	100	85	0
Green Foxtail	95	100	90	0
Jimsonweed	100	100	100	95
Johnson Grass	90	100	80	0
Lambsquarter	90	100	90	100
Morningglory	100	100	90	60
Nutsedge	90	90	10	5
Pigweed	95	100	70	60
Prickly Sida	10	50	5	0
Ragweed	100	100	100	40
Shattercane	100	100	100	0
Signalgrass	95	100	60	-
Smartweed	100	100	100	60
Soybean	90	100	95	70
Sunflower	100	100	100	30
Velvetleaf	100	100	100	85
Wild Proso	95	100	80	5
Woolly cupgrass	90	80	70	0
Yellow Foxtail	95	100	50	0

Table D	COMPOUND			
Rate 17 g/ha	1	3	4	28
POSTEMERGENCE				
Barnyardgrass	95	100	100	60
Bindweed	90	90	80	50
Blk Nightshade	100	100	80	70
Cassia	0	0	0	0
Cocklebur	100	100	80	30
Corn	0	5	0	0
Cotton	90	100	80	50
Crabgrass	90	90	80	5
Fall Panicum	95	90	70	0
Giant Foxtail	90	70	60	0
Green Foxtail	90	90	80	0
Jimsonweed	100	100	100	60
Johnson Grass	90	80	60	0
Lambsquarter	85	100	75	100
Morningglory	100	100	80	20
Nutsedge	90	90	0	0
Pigweed	95	100	70	40
Prickly Sida	0	50	0	0
Ragweed	100	100	100	40
Shattercane	100	100	70	0
Signalgrass	95	100	60	-
Smartweed	100	100	80	50
Soybean	90	100	90	60
Sunflower	100	100	85	0
Velvetleaf	100	100	100	85
Wild Proso	95	100	70	0
Woolly cupgrass	85	50	50	0
Yellow Foxtail	95	90	50	0

Table D	COMPOUND			
Rate 8 g/ha	1	3	4	28
POSTEMERGENCE				
Barnyardgrass	90	100	100	5
Bindweed	85	90	20	40
Blk Nightshade	100	100	70	70
Cassia	0	0	0	0
Cocklebur	100	100	60	0
Corn	0	5	0	0
Cotton	90	100	50	35
Crabgrass	80	80	60	0
Fall Panicum	80	80	30	0
Giant Foxtail	70	60	30	0
Green Foxtail	90	70	5	0
Jimsonweed	95	100	100	60
Johnson Grass	70	70	5	0
Lambsquarter	30	90	50	90
Morningglory	90	85	80	0
Nutsedge	60	70	0	0
Pigweed	85	80	40	40
Prickly Sida	0	30	0	0
Ragweed	90	95	60	30
Shattercane	90	80	40	0
Signalgrass	90	90	55	-
Smartweed	90	90	70	50
Soybean	80	90	70	55
Sunflower	90	100	80	0
Velvetleaf	100	100	80	70
Wild Proso	90	100	60	0
Woolly cupgrass	60	10	10	0
Yellow Foxtail	95	90	40	0

Table D	COMPOUND	
Rate 4 g/ha	1	2
POSTEMERGENCE		
Barnyardgrass	100	100
Bindweed	70	90
Blk Nightshade	70	95
Cassia	0	0
Cocklebur	70	100
Corn	0	0
Cotton	70	95
Crabgrass	60	60
Fall Panicum	70	50
Giant Foxtail	50	30
Green Foxtail	60	30
Jimsonweed	100	100
Johnson Grass	30	40
Lambsquarter	0	60
Morningglory	60	90
Nutsedge	0	5
Pigweed	60	80
Prickly Sida	0	0
Ragweed	90	90
Shattercane	70	60
Signalgrass	80	80
Smartweed	40	80
Soybean	50	90
Sunflower	80	90
Velvetleaf	100	100
Wild Proso	80	80
Woolly cupgrass	70	10
Yellow Foxtail	80	85

TEST E

Seeds of barley (*Hordeum vulgare*), barnyardgrass (*Echinochloa crus-galli*), bedstraw (*Galium aparine*), blackgrass (*Alopecurus myosuroides*), chickweed (*Stellaria media*), cocklebur (*Xanthium strumarium*), corn (*Zea mays*), cotton (*Gossypium hirsutum*), crabgrass (*Digitaria sanguinalis*), downy brome (*Bromus tectorum*), giant foxtail (*Setaria faberii*), lambsquarters (*Chenopodium album*), morningglory (*Ipomoea hederacea*), rape (*Brassica napus*), rice (*Oryza sativa*), sorghum (*Sorghum bicolor*), soybean (*Glycine max*), sugar beet (*Beta vulgaris*), velvetleaf (*Abutilon theophrasti*), wheat (*Triticum aestivum*), wild buckwheat (*Polygonum convolvulus*), wild oat (*Avena fatua*) and purple nutsedge (*Cyperus rotundus*) tubers were planted and treated preemergence with test chemicals formulated in a non-phytotoxic solvent mixture which included a surfactant.

At the same time, these crop and weed species were also treated with postemergence applications of test chemicals formulated in the same manner. Plants ranged in height from two to eighteen cm (one to four leaf stage) for postemergence treatments. Treated plants and controls were maintained in a greenhouse for twelve to sixteen days, after which all species were compared to controls and visually evaluated. Plant response ratings, summarized in Table E, are based on a scale of 0 to 10 where 0 is no effect and 10 is complete control. A dash (-) response means no test result.

Table E	COMPOUND	
Rate 2000 g/ha	1	28
POSTEMERGENCE		
Barley	9	6
Barnyardgrass	9	9
Bedstraw	10	9
Blackgrass	10	3
Chickweed	10	9
Cocklebur	9	9
Corn	10	4
Cotton	10	9
Crabgrass	9	9
Downy brome	9	7
Giant foxtail	9	8
Lambsquarter	9	9
Morningglory	9	10
Nutsedge	8	7
Rape	10	10
Rice	8	9
Sorghum	10	8
Soybean	9	10
Sugar beet	9	10
Velvetleaf	10	10
Wheat	10	10
Wild buckwheat	9	8
Wild oat	10	5

Table E	COMPOUND	
Rate 2000 g/ha	1	28
Pre Soil		
Barley	5	9
Barnyardgrass	10	8
Bedstraw	9	8
Blackgrass	9	4
Chickweed	9	8
Cocklebur	9	5
Corn	6	0
Cotton	9	7
Crabgrass	10	10
Downy brome	10	9
Giant foxtail	10	9
Lambsquarter	10	10
Morningglory	10	9
Nutsedge	10	4
Rape	10	7
Rice	10	10
Sorghum	10	3
Soybean	9	9
Sugar beet	10	10
Velvetleaf	10	10
Wheat	8	4
Wild buckwheat	10	7
Wild oat	10	5

Table E	COMPOUND							
Rate 400 g/ha	1	2	12	15	16	18	28	29
POSTEMERGENCE								
Barley	9	9	8	2	3	4	5	2
Barnyardgrass	9	9	10	9	10	9	9	9
Bedstraw	10	9	9	7	10	9	8	9
Blackgrass	9	9	9	7	9	9	3	0
Chickweed	9	9	10	9	10	9	9	9
Cocklebur	9	9	10	9	10	10	9	9
Corn	10	10	6	5	9	8	3	6
Cotton	10	10	10	9	10	10	9	9
Crabgrass	9	9	10	9	10	9	9	9
Downy brome	9	9	9	2	7	7	7	6
Giant foxtail	9	9	10	9	9	9	8	6
Lambsquarter	9	9	9	8	10	9	9	9
Morningglory	10	9	10	3	7	9	9	0
Nutsedge	9	8	9	9	9	7	5	0
Rape	10	10	10	3	10	6	8	9
Rice	8	9	10	9	9	9	8	8
Sorghum	9	10	10	6	9	10	6	7
Soybean	9	9	9	7	9	7	9	8
Sugar beet	10	10	10	8	10	10	10	10
Velvetleaf	10	10	10	8	10	9	10	9
Wheat	9	9	9	6	9	8	9	2
Wild buckwheat	9	9	9	2	10	9	8	8
Wild oat	10	9	10	9	10	10	4	9

Table E	COMPOUND							
Rate 400 g/ha	1	2	12	15	16	18	28	29
PREEMERGENCE								
Barley	1	0	0	0	0	0	0	0
Barnyardgrass	8	10	9	9	10	5	2	1
Bedstraw	7	3	8	9	10	8	5	0
Blackgrass	8	5	5	3	4	3	0	0
Chickweed	9	8	10	8	9	8	8	8
Cocklebur	7	8	8	3	6	6	2	0
Corn	1	1	1	0	1	1	0	0
Cotton	9	4	3	3	3	3	2	0
Crabgrass	10	9	10	9	10	10	9	9
Downy brome	9	9	9	2	10	0	0	0
Giant foxtail	10	8	7	5	9	9	2	3
Lambsquarter	10	10	10	9	10	9	10	9
Morningglory	7	3	9	0	1	1	3	0
Nutsedge	6	2	5	0	8	3	0	0
Rape	4	2	5	2	0	1	4	5
Rice	9	9	10	8	9	6	6	4
Sorghum	8	9	9	0	9	4	1	0
Soybean	9	8	9	0	0	1	6	2
Sugar beet	10	10	10	8	10	10	10	8
Velvetleaf	10	10	10	7	10	10	10	5
Wheat	3	1	4	0	2	1	0	0
Wild buckwheat	7	5	6	2	0	1	0	0
Wild oat	7	7	7	3	10	9	1	0

Table E

Rate 200 g/ha	COMPOUND																		
	1	2	3	4	5	6	9	10	16	19	20	21	23	24	25	26	27	30	31
POSTEMERGENCE																			
Barley	8	8	6	7	9	9	7	0	7	0	1	2	3	7	0	3	4	10	9
Barnyardgrass	10	9	9	9	10	10	10	1	10	8	10	9	9	9	9	9	10	9	10
Bedstraw	9	9	9	9	10	9	6	-	9	5	8	7	9	9	6	9	10	9	8
Blackgrass	9	9	7	5	9	9	3	0	8	1	5	6	3	8	4	5	6	9	9
Chickweed	9	10	10	9	9	9	9	1	10	3	8	5	9	9	9	-	10	9	9
Cocklebur	10	9	9	9	10	10	10	0	10	9	10	10	10	9	10	10	10	10	10
Corn	3	9	3	1	7	2	2	1	9	1	1	0	6	5	2	3	8	3	7
Cotton	10	10	9	10	10	10	10	3	10	4	9	9	10	10	10	10	10	10	10
Crabgrass	9	9	9	9	10	10	9	0	9	4	4	5	10	9	3	3	10	9	9
Downy brome	8	9	9	8	9	9	4	0	9	0	3	1	5	8	0	2	5	9	9
Giant foxtail	9	9	5	8	9	10	9	1	9	2	2	5	10	9	3	5	9	9	9
Lambsquarter	9	9	10	9	9	10	9	2	9	9	9	9	9	9	9	9	10	9	9
Morningglory	10	9	9	10	10	10	8	1	8	3	2	4	9	10	1	9	9	9	10
Nutsedge	-	8	4	3	5	9		-	7	4	2	1		7	2	7	9	9	9
Rape	9	10	10	8	10	10	3	0	10	4	7	8	10	10	8	10	10	10	9
Rice	9	9	8	10	9	10	9	0	9	5	8	9	9	9	6	9	9	9	9
Sorghum	9	10	8	9	10	10	9	0	10	0	3	2	9	8	2	3	10	10	10
Soybean	10	9	6	9	10	10	9	2	7	4	4	5	10	9	7	6	9	8	10
Sugar beet	9	10	10	10	10	10	8	4	10	7	10	10	9	9	10	10	10	10	10
Velvetleaf	10	10	9	10	10	10	10	2	10	9	9	7	10	10	10	10	10	10	10
Wheat	6	9	7	8	9	9	4	0	9	1	2	2	5	7	4	3	9	9	9
Wild buckwheat	9	9	7	9	10	9	1	0	9	1	2	2	10	6	2	7	9	6	8
Wild oat	9	9	8	9	10	10	7	0	10	1	5	6	8	9	3	4	10	10	10

Table E	COMPOUND																		
Rate 200 g/ha	1	2	3	4	5	6	9	10	16	19	20	21	23	24	25	26	27	30	31
PREEMERGENCE																			
Barley	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Barnyardgrass	9	10	10	6	9	5	7	0	10	0	0	1	3	1	0	2	5	9	10
Bedstraw	1	8	3	10	7	7	0	0	2	0	-	-		7		0	9	9	9
Blackgrass	4	2	2	6	8	9	1	0	3	0	1	0	0	1	0	0	2	6	9
Chickweed	9	9	7	9	9	9	6	0	10	-	2	-	3	9	-	-	9	10	10
Cocklebur	3	7	4	5	10	7	0	0	3	0	0	0	0	0	0	4	3	1	3
Corn	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	1	4	5	2	2	4	0	0	0	0	0	0	2	0	0	1	0	5	8
Crabgrass	9	9	10	9	10	10	6	0	10	0	1	3	10	9	1	2	10	10	10
Downy brome	7	7	1	8	9	8	0	0	7	0	0	0	0	1	0	0	8	9	10
Giant foxtail	7	8	6	1	8	9	3	0	7	0	0	1	7	3	0	1	8	6	9
Lambsquarter	10	10	10	9	9	10	9	0	9	-	7	-	10	9		-	10	10	10
Morningglory	2	3	7	3	8	4	3	0	0	0	0	0	0	1	0	1	3	4	6
Nutsedge	-	0		2	4	4	-	-	0	0	0	6	1	0	0	2	-	2	10
Rape	0	7	8	5	8	3	4	0	1	0	0	0	0	8	0	0	3	7	7
Rice	8	9	8	0	9	9	2	0	9	0	0	0	3	2	0	3	4	9	10
Sorghum	8	9	7	2	9	9	0	0	7	0	0	0	2	1	0	0	6	4	9
Soybean	6	5	6	0	7	5	0	0	4	0	0	0	0	2	0	0	0	5	3
Sugar beet	9	10	10	10	10	10	9	0	10	5	0	0	8	4	0	0	9	9	10
Velvetleaf	10	10	9	8	10	10	10	9	10	0	0	2	9	10	2	6	10	10	10
Wheat	1	0	0	0	6	7	0	0	0	0	0	0	0	0	0	0	1	0	7
Wild buckwheat	0	4	1	2	4	5	0	0	0	0	0	0	0	2	0	0	0	3	2
Wild oat	10	3	3	4	9	8	4	0	3	0	0	0	0	8	0	0	9	2	10

Table E	COMPOUND										
Rate 100 g/ha	1	2	5	6	7	8	12	15	16	18	29
POSTEMERGENCE											
Barley	5	8	9	9	2	8	4	1	1	1	0
Barnyardgrass	10	10	10	10	10	10	10	9	10	9	9
Bedstraw	9	9	9	9	9	8	8	8	10	9	7
Blackgrass	9	9	9	9	5	8	7	5	8	8	0
Chickweed	9	9	9	9	9	8	10	9	10	9	9
Cocklebur	10	9	10	10	9	9	9	9	10	10	9
Corn	1	9	7	2	2	0	2	3	8	6	2
Cotton	10	10	10	10	8	10	10	5	10	10	9
Crabgrass	9	9	9	10	9	9	9	9	10	9	9
Downy brome	7	8	9	8	3	8	8	1	6	6	0
Giant foxtail	9	9	9	9	6	8	9	9	9	9	1
Lambsquarter	9	9	9	9	9	8	9	8	10	9	9
Morningglory	10	9	9	9	9	9	10	3	8	9	0
Nutsedge	8	8	-	8	5	9	8	2	6	5	0
Rape	7	10	9	10	9	10	10	2	7	5	7
Rice	9	9	9	8	9	9	10	9	9	8	8
Sorghum	9	10	9	9	9	9	10	2	9	9	3
Soybean	10	9	10	10	6	9	9	3	7	7	6
Sugar beet	9	10	10	10	10	10	10	8	10	10	10
Velvetleaf	10	9	10	7	9	9	10	8	10	9	7
Wheat	6	9	9	9	4	9	7	6	8	5	0
Wild buckwheat	7	8	8	9	4	2	8	2	10	9	7
Wild oat	9	9	9	9	5	9	10	6	9	9	4

Table E	COMPOUND										
Rate 100 g/ha	1	2	5	6	7	8	12	15	16	18	29
PREEMERGENCE											
Barley	0	0	0	0	0	0	0	0	0	0	0
Barnyardgrass	6	7	2	3	2	3	2	0	3	1	0
Bedstraw	0	3	0	0	0	2	0	4	9	1	0
Blackgrass	3	1	4	4	0	1	3	0	2	1	0
Chickweed	7	8	8	3	2	5	5	7	9	7	3
Cocklebur	3	4	5	2	-	8	3	0	7	-	0
Corn	0	0	0	0	0	0	0	0	0	0	0
Cotton	0	2	0	3	0	0	2	0	0	0	0
Crabgrass	5	9	6	5	3	7	9	9	9	9	1
Downy brome	3	7	3	7	0	3	2	0	4	0	0
Giant foxtail	4	5	3	3	0	3	2	3	8	4	0
Lambsquarter	10	10	9	9	8	9	9	9	10	9	8
Morningglory	2	2	3	3	0	-	8	0	0	0	0
Nutsedge	-	0	-	-	0	3	0	0	4	1	0
Rape	0	1	0	0	0	0	0	0	0	0	0
Rice	3	9	5	5	0	0	8	0	3	0	0
Sorghum	5	0	6	5	0	0	0	0	2	3	0
Soybean	3	0	0	0	5	0	5	0	0	0	0
Sugar beet	7	10	0	0	0	3	9	1	10	9	0
Velvetleaf	9	10	10	10	0	8	10	0	10	10	0
Wheat	0	0	0	0	0	0	0	0	0	0	0
Wild buckwheat	0	2	0	0	0	0	0	2	0	0	0
Wild oat	7	1	6	7	0	1	7	0	9	2	0

Table E	COMPOUND																				
Rate 50 g/ha	1	2	3	4	5	6	7	8	9	10	16	19	20	21	23	24	25	26	27	30	31
POSTEMERGENCE																					
Barley	5	4	2	5	9	9	1	3	2	0	2	0	0	0	2	6	0	1	2	9	9
Barnyardgrass	10	10	9	9	10	10	10	10	10	0	10	5	6	4	9	9	8	9	10	9	10
Bedstraw	8	9	8	9	9	9	8	8	3	0	9	2	7	6	9	9	7	9	10	9	7
Blackgrass	7	8	5	4	9	9	2	5	1	0	7	0	1	1	3	4	3	3	6	9	8
Chickweed	9	10	10	9	9	9	7	8	8	0	10	2	-	1	9	9	9	-	10	9	-
Cocklebur	10	9	8	9	10	10	9	9	10	0	10	6	9	8	10	9	9	9	10	10	9
Corn	0	9	1	1	3	1	2	0	1	0	6	0	0	0	3	1	0	1	5	2	2
Cotton	10	10	8	9	10	10	8	7	9	0	10	5	9	9	10	9	6	9	10	10	10
Crabgrass	9	9	9	8	9	9	7	9	9	0	9	3	2	2	9	8	3	1	8	9	9
Downy brome	7	7	6	6	9	9	1	6	3	0	7	0	0	0	1	4	0	2	4	9	9
Giant foxtail	9	9	3	5	9	9	5	7	9	1	9	1	1	1	9	8	1	3	8	9	9
Lambsquarter	8	9	9	9	9	9	8	7	8	0	9	8	8	7	9	9	8	9	9	9	9
Morningglory	9	9	9	10	10	9	8	8	8	1	8		1	1	9	9	2	8	8	9	8
Nutsedge	7	8	4	3	4	9	5	2		-	7	0	0	0		2	0	2	7	4	7
Rape	7	9	10	8	10	9	8	10	1	0	7	2	7	5	9	10	7	9	10	10	8
Rice	9	9	8	9	9	9	8	9	9	0	9	0	3	7	9	9	2	9	9	9	9
Sorghum	9	10	8	9	9	9	9	9	9	0	9	0	3	0	8	3	2	3	9	10	10
Soybean	10	9	5	9	10	9	7	8	8	0	6	4	4	2	9	9	4	4	9	9	9
Sugar beet	9	10	9	10	10	10	9	10	9	0	10	7	9	8	9	3	10	9	10	10	8
Velvetleaf	10	10	9	10	10	10	9	9	10	0	10	7	8	7	10	10	9	10	10	10	9
Wheat	5	8	4	7	9	9	4	8	3	0	5	0	1	1	4	4	1	1	6	9	9
Wild buckwheat	6	8	7	7	9	9	2	1	0	0	7	1	1	1	6	3	2	6	6	4	3
Wild oat	9	8	3	7	10	10	5	8	4	0	9	0	3	3	3	9	2	3	9	10	10

Table B

	COMPOUND																				
Rate 50 g/ha	1	2	3	4	5	6	7	8	9	10	16	19	20	21	23	24	25	26	27	30	31
PREEMERGENCE																					
Barley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
Barnyardgrass	3	2	4	0	2	2	0	1	3	0	0	0	0	0	0	0	0	1	3	1	2
Bedstraw	0	3	-	3	7	4	0	0	0	0	2	-	2	0	0	3	0	0	2	3	4
Blackgrass	0	0	1	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9
Chickweed	1	8	4	7	8	7	0	5	0	0	9	0	0	-	3	6	-	0	8	10	6
Cocklebur	0	3	2	2	4	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
Crabgrass	5	9	8	6	9	10	2	3	4	0	9	0	0	0	8	5	-	1	6	10	10
Downy brome	0	0	0	4	2	4	0	0	0	0	0	0	0	0	0	0	0	0	2	3	6
Giant foxtail	3	2	1	0	3	6	0	0	0	0	3	0	0	0	2	0	0	0	1	3	5
Lambsquarter	9	9	9	8	9	9	0	8	8	0	9	0	-	0	10	7	0	0	10	9	10
Morningglory	0	2	3	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Nutsedge		0	-	0	2	2	0	0	-		0	0	0		-	0	0	-	0	0	0
Rape	0	2	2	5	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5
Rice	3	0	4	0	5	7	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3
Sorghum	4	0	3	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Soybean	1	0	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Sugar beet	7	10	9	10	10	9	0	0	4	0	7	0	0	0	0	0	0	0	7	8	9
Velvetleaf	10	7	4	7	10	10	0	5	8	0	10	0	0	0	3	8	0	4	5	9	10
Wheat	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Wild buckwheat	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild oat	8	1	0	3	7	4	0	0	0	0	2	0	0	0	0	5	0	0	7	1	8

Table E	COMPOUND		
Rate 20 g/ha	1	5	6
POSTEMERGENCE			
Barley	4	9	8
Barnyardgrass	10	10	9
Bedstraw	8	8	8
Blackgrass	7	9	6
Chickweed	7	9	8
Cocklebur	10	10	10
Corn	0	1	1
Cotton	9	8	10
Crabgrass	9	8	9
Downy brome	6	7	7
Giant foxtail	9	9	9
Lambsquarter	8	9	9
Morningglory	9	9	8
Nutsedge	8	4	4
Rape	2	9	6
Rice	9	9	8
Sorghum	9	9	9
Soybean	10	9	8
Sugar beet	9	10	7
Velvetleaf	10	10	10
Wheat	5	9	9
Wild buckwheat	4	7	7
Wild oat	9	9	9

Table E	COMPOUND		
Rate 20 g/ha	1	5	6
PREEMERGENCE			
Barley	0	0	0
Barnyardgrass	0	1	1
Bedstraw	0	0	0
Blackgrass	0	0	0
Chickweed	0	5	0
Cocklebur	0	0	0
Corn	0	0	0
Cotton	0	0	0
Crabgrass	2	1	1
Downy brome	0	0	0
Giant foxtail	0	0	0
Lambsquarter	6	9	8
Morningglory	0	0	0
Nutsedge	-	-	-
Rape	0	0	0
Rice	0	0	0
Sorghum	0	0	0
Soybean	0	0	0
Sugar beet	0	0	0
Velvetleaf	10	10	9
Wheat	0	0	0
Wild buckwheat	0	0	0
Wild oat	0	3	3

Table E	COMPOUND	
Rate 10 g/ha	7	8
POSTEMERGENCE		
Barley	0	0
Barnyardgrass	9	8
Bedstraw	4	2
Blackgrass	0	1
Chickweed	5	6
Cocklebur	8	6
Corn	0	0
Cotton	3	4
Crabgrass	3	3
Downy brome	0	0
Giant foxtail	2	2
Lambsquarter	7	3
Morningglory	7	2
Nutsedge	2	3
Rape	0	1
Rice	4	7
Sorghum	4	6
Soybean	3	3
Sugar beet	6	9
Velvetleaf	5	7
Wheat	1	2
Wild buckwheat	0	0
Wild oat	0	2

Table E	COMPOUND	
Rate 10 g/ha	7	8
PREEMERGENCE		
Barley	0	0
Barnyardgrass	0	0
Bedstraw	0	0
Blackgrass	0	0
Chickweed	0	0
Cocklebur	0	0
Corn	0	0
Cotton	0	0
Crabgrass	0	0
Downy brome	0	0
Giant foxtail	0	0
Lambsquarter	0	0
Morningglory	0	0
Nutsedge	0	0
Rape	0	0
Rice	0	0
Sorghum	0	0
Soybean	0	0
Sugar beet	0	0
Velvetleaf	0	0
Wheat	0	0
Wild buckwheat	0	0
Wild oat	0	0

TEST F

Compounds evaluated in this test were formulated in a non-phytotoxic solvent mixture and applied to the surface of the water which was contained in each pot. Individual containers of barnyardgrass (*Echinochloa oryzicola*), small flower umbrella sedge (*Cyperus difformus*), common falsepimpernel (*Lindernia procumbens*), monochoria (*Monochoria vaginalis*) and bulrush (*Scirpus juncoides*) were seeded and allowed to grow until the 1.5 to 2.5 leaf stage of development. A clay loam soil was used for this propagation. Japonica rice (*Oryza sativa*) was tran- splanted at 0 and 2 cm depth five days before application of the test compound to the water surface.

Treated plants and untreated controls were maintained under greenhouse conditions for twenty to thirty days at which time treated plants were compared to untreated controls and visually evaluated. Plant response ratings, summarized in Table F, are based upon a 0 to 100 scale where 0 is no effect and 100 is complete control. A dash response (-) indicated that no test result was recorded.

Table F	COMPOUND
Rate 250 g/ha	3
Flood Saita soi	
barnyard early	100
barnyard late	85
C. difformis ea	80
C. difformis la	90
Japoni rice 0cm	100
Japoni rice 2cm	100
L. procumben ea	100
L. procumben la	100
M. vaginalis ea	100
M. vaginalis la	80
S. juncoides 1.	90
S. juncoides 2.	70

Table F	COMPOUND
Rate 125 g/ha	3
Flood Saita soi	
barnyard early	100
barnyard late	70
C. difformis ea	85
C. difformis la	70
Japoni rice 0cm	100
Japoni rice 2cm	40
L. procumben ea	100
L. procumben la	100
M. vaginalis ea	100
M. vaginalis la	80
S. juncoides 1.	85
S. juncoides 2.	50

Table F	COMPOUND	
Rate 64 g/ha	2	3
Flood Saita soi		
barnyard early	90	70
barnyard late	65	40
C. difformis ea	100	95
C. difformis la	70	40
Japoni rice 0cm	100	95
Japoni rice 2cm	75	70
L. procumben ea	100	100
L. procumben la	100	100
M. vaginalis ea	100	100
M. vaginalis la	80	80
S. juncoides 1.	75	70
S. juncoides 2.	65	50

Table F	COMPOUND		
Rate 32 g/ha	1	2	3
Flood Saita soi			
barnyard early	85	45	20
barnyard late	50	45	20
C. difformis ea	80	55	60
C. difformis la	85	50	40
Japoni rice 0cm	90	75	40
Japoni rice 2cm	65	5	0
L. procumben ea	100	100	100
L. procumben la	100	90	100
M. vaginalis ea	100	80	70
M. vaginalis la	70	75	70
S. juncoides 1.	80	65	50
S. juncoides 2.	60	40	30

Table F	COMPOUND	
Rate 16 g/ha	1	2
Flood Saita soi		
barnyard early	40	20
barnyard late	65	45
C. difformis ea	80	50
C. difformis la	75	50
Japoni rice 0cm	65	40
Japoni rice 2cm	25	0
L. procumben ea	100	100
L. procumben la	100	100
M. vaginalis ea	90	75
M. vaginalis la	75	75
S. juncoides 1.	40	20
S. juncoides 2.	40	30

Table F	COMPOUND	
Rate 8 g/ha	1	2
Flood Saita soi		
barnyard early	40	20
barnyard late	30	20
C. difformis ea	55	20
C. difformis la	50	20
Japoni rice 0cm	35	10
Japoni rice 2cm	0	0
L. procumben ea	100	100
L. procumben la	100	100
M. vaginalis ea	70	60
M. vaginalis la	70	65
S. juncoides 1.	40	10
S. juncoides 2.	40	0

Table F	COMPOUND
Rate 4 g/ha	1
Flood Saita soi	
barnyard early	30
barnyard late	40
C. difformis ea	30
C. difformis la	20
Japoni rice 0cm	20
Japoni rice 2cm	5
L. procumben ea	100
L. procumben la	100
M. vaginalis ea	50
M. vaginalis la	65
S. juncoides 1.	20
S. juncoides 2.	30

TEST G

Compounds evaluated in this test were formulated in a non-phytotoxic solvent mixture which included a surfactant and applied to the soil surface before plant seedlings emerged (preemergence application) and to plants that were in the one-to four leaf stage (postemergence application). A sandy loam soil was used for the preemergence test while a mixture of sandy loam soil and greenhouse potting mix in a 60:40 ratio was used for the postemergence test. Test compounds were applied within approximately one day after planting seeds for the preemergence test.

Plantings of these crops and weed species were adjusted to produce plants of appropriate size for the postemergence test. All plant species were grown using normal greenhouse practices. Crop and weed species include annual bluegrass (*Poa annua*), black nightshade (*Solanum nigra*), blackgrass (*Alopecurus myosuroides*), chickweed (*Stellaria media*), deadnettle (*Lamium amplexicaule*), downy brome (*Bromus tectorum*), field violet (*Viola arvensis*), galium (*Galium aparine*), green foxtail (*Setaria viridis*), jointed goatgrass (*Aegilops cylindrica*), kochia (*Kochia scoparia*), lambsquarters (*Chenopodium album*), littleseed canarygrass (*Phalaris minor*), rape (*Brassica napus*), redroot pigweed (*Amaranthus retroflexus*), ryegrass (*Lolium multiflorum*), sentless chamonile (*Matricaria inodora*), speedwell (*Veronica persica*), spring barely (*Hordeum vulgare cv. 'Klages'*), spring wheat (*Triticum aestivum cv. 'ERA'*), sugar beet (*Beta vulgaris cv. 'US1'*), sunflower (*Helianthus annuus cv. 'Russian Giant'*), wild buckwheat (*Polygonum convolvulus*), wild mustard (*Sinapis arvensis*), wild oat (*Avena fatua*), windgrass (*Apera spica-venti*), winter barley (*Hordeum vulgare cv.'Igri'*) and winter wheat (*Triticum aestivum cv. 'Talent'*).

Wild oat was treated at two growth stages. The first stage (1) was when the plant had two to three leaves. The second stage (2) was when the plant had approximately four leaves or in the initial stages of tillering. Treated plants and untreated controls were maintained in a greenhouse for approximately 21 to 28 days, after which all treated plants were compared to untreated controls and visually evaluated. Plant response ratings, summarized in Table G, are based upon a 0 to 100 scale where 0 is no effect and 100 is complete control. A dash response (-) means no test result.

Table G	COMPOUND
Rate 250 g/ha	10
POSTEMERGENCE	
Annual Bluegras	30
Blackgrass (2)	30
Blk Nightshade	100
Chickweed	100
Deadnettle	100
Downy brome	50
Field violet	100
Galium (2)	100
Green foxtail	100
Jointed Goatgra	30
Kochia	85
Lambsquarters	100
LS Canarygrass	100
Rape	-
Redroot Pigweed	100
Russian Thistle	100
Ryegrass	20
Scentless Chamo	95
Speedwell	-
Spring Barley	30
Sugar beet	-
Sunflower	-
Veronica hedera	100
Wheat (Spring)	30
Wheat (Winter)	20
Wild buckwheat	100
Wild mustard	100
Wild oat (1)	65
Wild oat (2)	-
Windgrass	45
Winter Barley	30

Table G	COMPOUND						
Rate 125 g/ha	2	5	6	8	9	10	12
POSTEMERGENCE							
Annual Bluegras	85	100	65	100	40	20	20
Blackgrass (2)	45	30	20	70	45	20	20
Blk Nightshade	100	100	100	100	100	100	100
Chickweed	100	100	100	95	100	100	100
Deadnettle	100	100	100	100	100	100	100
Downy brome	50	40	55	75	25	30	20
Field violet	100	60	70	100	100	100	75
Galium (2)	40	50	60	60	70	75	98
Green foxtail	100	100	75	100	100	100	100
Jointed Goatgra	40	30	40	100	30	20	30
Kochia	100	100	75	100	100	100	100
Lambsquarters	100	100	95	100	100	100	100
LS Canarygrass	100	60	70	100	70	45	30
Rape	-	-	100	-	-	-	40
Redroot Pigweed	100	100	65	100	100	100	100
Russian Thistle	100	100	-	80	100	100	-
Ryegrass	20	20	15	20	5	0	0
Scentless Chamo	100	100	100	100	100	75	100
Speedwell	-	-	-	-	-		-
Spring Barley	40	40	50	85	10	10	0
Sugar beet	-		10	-	-	-	100
Sunflower	-	-	70	-		-	100
Veronica hedera	100	100	-	100	100	100	100
Wheat (Spring)	40	30	40	100	40	20	30
Wheat (Winter)	60	40	20	95	20	15	20
Wild buckwheat	100	55	10	50	100	-	40
Wild mustard	100	100	70	100	100	100	100
Wild oat (1)	100	100	75	100	100	40	100
Wild oat (2)	-	-	-	-	-	-	-
Windgrass	50	55	45	95	60	20	30
Winter Barley	30	20	55	45	10	10	0

Table G	COMPOUND										
Rate 62 g/ha	1	2	4	5	6	7	8	9	10	12	30
POSTEMERGENCE											
Annual Bluegras	100	60	-	70	50	100	100	50	10	20	100
Blackgrass (2)	55	35	-	25	20	50	60	40	20	30	60
Blk Nightshade	100	100	100	100	75	100	100	100	75	100	100
Chickweed	100	100	100	100	75	100	100	100	100	100	100
Deadnettle	100	100	100	100	100	100	100	100	100	100	100
Downy brome	60	40	-	50	30	100	75	25	20	10	95
Field violet	100	100	100	50	70	100	100	70	70	60	70
Galium (2)	65	30	60	40	30	55	60	70	60	70	40
Green foxtail	75	100	-	65	60	100	100	100	100	100	100
Jointed Goatgra	40	30	-	30	20	100	100	20	10	20	100
Kochia	65	65	65	100	60	50	100	100	70	55	80
Lambsquarters.	100	100	100	100	60	100	100	100	100	100	100
LS Canarygrass	100	40	-	40	50	100	100	50	40	20	100
Rape	100	-	-	-	70	-	-	-	-	40	-
Redroot Pigweed	100	70	100	100	30	100	100	100	100	100	100
Russian Thistle	100	100	100	100	30	100	80	85	100	-	100
Ryegrass	30	20	-	20	10	15	25	0	0	0	30
Scentless Chamo	100	100	60	100	65	100	100	100	70	60	100
Speedwell	-	-	-	-	-	-	-	-	-	-	-
Spring Barley	60	30	20	30	40	100	60	5	20	0	80
Sugar beet	100	-	-	-	10	-	-	-	-	100	-
Sunflower	100	-	-	-	40	-	-	-	-	100	-
Veronica hedera	100	100	100	100	20	100	100	100	100	100	100
Wheat (Spring)	30	30	25	20	30	100	85	30	10	20	100
Wheat (Winter)	40	30	30	30	15	100	100	20	10	10	100
Wild buckwheat	60	70	50	40	10	100	70	100	100	10	10
Wild mustard	100	100	-	100	75	-	70	60	100	50	100
Wild oat (1)	95	100	-	100	70	100	100	60	30	60	100
Wild oat (2)	-	-	-	-	-	-	-	-	-	-	-
Windgrass	100	30	-	30	45	85	100	50	20	30	100
Winter Barley	50	20	20	20	30	85	40	15	10	10	70

Table G

	COMPOUND										
Rate 31 g/ha	1	2	4	5	6	7	8	9	10	12	30
POSTEMERGENCE											
Annual Bluegras	60	50	-	30	10	100	100	30	20	10	100
Blackgrass (2)	50	30	-	20	10	40	50	30	20	15	50
Blk Nightshade	100	100	100	100	75	100	100	100	75	100	100
Chickweed	100	100	100	100	60	100	80	100	100	70	100
Deadnettle	100	100	60	100	75	65	75	100	100	70	100
Downy brome	50	30	-	30	20	65	50	20	10	15	75
Field violet	100	65	60	-	50	60	100	50	60	50	-
Galium (2)	65	30	60	20	20	50	50	60	50	50	40
Green foxtail	70	70	-	65	55	100	75	100	80	65	100
Jointed Goatgra	30	20	-	15	10	45	75	10	0	20	50
Kochia	60	55	60	60	50	20	60	70	60	40	70
Lambsquarters	100	100	100	100	50	100	100	100	100	75	100
LS Canarygrass	100	30	-	30	30	100	100	35	30	15	100
Rape	70	-	-	-	60	-	-	-	-	20	-
Redroot Pigweed	100	50	-	75	30	70	50	80	70	70	100
Russian Thistle	100	75	100	75	20	100	70	80	70	-	80
Ryegrass	20	10	-	10	0	15	20	0	0	0	50
Scentless Chamo	100	75	50	70	60	100	100	100	60	60	100
Speedwell	100	-	-	-	-	-	-	-	-	-	-
Spring Barley	45	20	10	20	30	100	65	0	5	0	50
Sugar beet	100	-	-	-	0	-	-	-	-	100	
Sunflower	100	-	-	-	30	-	-	-	-	85	-
Veronica hedera	100	70	100	100	10	100	60	70	60	75	100
Wheat (Spring)	20	20	10	20	20	95	75	20	10	20	70
Wheat (Winter)	30	20	20	20	15	55	60	10	0	10	85
Wild buckwheat	100	50	40	50	0	100	60	75	20	10	10
Wild mustard	100	70	-	80	70	55	-	30	70	30	100
Wild oat (1)	50	100	-	65	50	100	100	40	20	20	100
Wild oat (2)	100	45	-	-	-	-	-	-	-	-	-
Windgrass	70	10	-	20	20	55	80	10	10	20	50
Winter Barley	30	20	10	30	20	55	30	0	0	0	30

Table G	COMPOUND	
Rate 31 g/ha	1	2
PREEMERGENCE		
Annual Bluegras	0	0
Blackgrass (2)	0	15
Blk Nightshade	35	0
Chickweed	15	10
Deadnettle	60	20
Downy brome	0	5
Galium (2)	0	5
Green foxtail	10	0
Jointed Goatgra	0	0
Kochia	15	40
Lambsquarters	85	95
LS Canarygrass	0	0
Redroot Pigweed	80	-
Ryegrass	0	0
Scentless Chamo	0	0
Speedwell	100	70
Spring Barley	0	0
Wheat (Spring)	0	0
Wheat (Winter)	0	0
Wild buckwheat	0	20
Wild mustard	0	10
Wild oat (1)	0	0
Windgrass	0	0
Winter Barley	0	0

Table G

	COMPOUND								
Rate 16 g/ha	1	2	4	5	6	7	8	9	30
POSTEMERGENCE									
Annual Bluegras	50	10	-	20	40	70	80	20	85
Blackgrass (2)	40	20	-	10	35	20	30	20	30
Blk Nightshade	100	75	100	100	55	100	75	100	100
Chickweed	100	100	100	100	75	80	70	75	100
Deadnettle	100	100	65	100	45	50	65	65	70
Downy brome	30	20	-	20	0	40	30	10	50
Field violet	100	50	-	30	45	30	60	50	60
Galium (2)	60	15	50	30	30	50	30	60	30
Green foxtail	65	50	-	100	55	100	70	70	100
Jointed Goatgra	20	10	-	10	0	20	30	10	40
Kochia	60	25	55	60	40	10	50	40	55
Lambsquarters	100	100	100	100	20	100	100	100	100
LS Canarygrass	100	20	-	20	40	50	100	30	100
Rape	50	-	-	-	-	-	-	-	-
Redroot Pigweed	100	65	60	60	20	60	30	80	100
Russian Thistle	100	75	70	80	0	100	60	80	70
Ryegrass	20	10	-	5	0	10	10	0	20
Scentless Chamo	50	75	50	60	60	75	70	60	75
Speedwell	100	-	-	-	-	-	-	-	-
Spring Barley	20	20	10	20	0	100	30	0	30
Sugar beet	100	-	-	-	-	-	-	-	-
Sunflower	65	-	-	-	-	-	-	-	-
Veronica hedera	100	75	70	100	30	65	60	75	70
Wheat (Spring)	10	20	10	20	10	65	30	10	70
Wheat (Winter)	20	10	10	15	0	50	30	5	50
Wild buckwheat	60	30	20	40	10	50	10	60	20
Wild mustard	100	65	-	60	-	-	60	30	100
Wild oat (1)	70	100	-	75	30	100	75	30	85
Wild oat (2)	85	45	-	-	-	-	-	-	-
Windgrass	50	10	-	10	30	30	50	20	50
Winter Barley	20	10	10	20	5	55	20	0	20

Table G	COMPOUND	
Rate 16 g/ha	1	2
PREEMERGENCE		
Annual Bluegras	0	0
Blackgrass (2)	0	5
Blk Nightshade	35	0
Chickweed	20	0
Deadnettle	15	0
Downy brome	0	0
Galium (2)	0	0
Green foxtail	0	0
Jointed Goatgra	0	0
Kochia	10	30
Lambsquarters	70	95
LS Canarygrass	0	0
Redroot Pigweed	75	65
Ryegrass	0	0
Scentless Chamo	-	0
Speedwell	60	60
Spring Barley	0	0
Wheat (Spring)	0	0
Wheat (Winter)	0	0
Wild buckwheat	0	5
Wild mustard	0	5
Wild oat (1)	0	0
Windgrass	0	0
Winter Barley	0	0

Table G	COMPOUND							
Rate 8 g/ha	1	2	4	6	7	8	9	30
POSTEMERGENCE								
Annual Bluegras	50	-	-	10	40	55	10	-
Blackgrass (2)	30	5	-	10	10	20	10	20
Blk Nightshade	100	85	100	40	100	75	100	75
Chickweed	55	85	100	60	70	50	100	80
Deadnettle	100	50	60	30	30	30	100	55
Downy brome	20	10	-	0	20	20	0	40
Field violet	75	15	60	30	40	50	60	50
Galium (2)	50	15	40	10	30	10	60	20
Green foxtail	65	75	-	55	60	65	100	65
Jointed Goatgra	20	0	-	0	10	10	10	30
Kochia	55	-	50	30	10	30	20	35
Lambsquarters	100	30	65	20	75	95	100	70
LS Canarygrass	100	5	-	40	40	65	25	65
Rape	40	-	-	-	-	-	-	-
Redroot Pigweed	60	25	50	10	50	30	70	70
Russian Thistle	100	-	60	0	75	50	40	70
Ryegrass	10	0	-	0	5	10	0	20
Scentless Chamo	65	25	50	50	60	60	60	70
Speedwell	65	35	-	-	-	-	-	-
Spring Barley	10	0	10	0	40	10	10	20
Sugar beet	100	-	-	-	-	-	-	-
Sunflower	65	-	-	-	-	-	-	-
Veronica hedera	100	-	50	30	60	60	100	60
Wheat (Spring)	10	0	10	10	30	15	10	40
Wheat (Winter)	10	0	10	0	30	20	5	30
Wild buckwheat	40	0	25	0	30	0	40	10
Wild mustard	100	-	-	30	50	50	30	100
Wild oat (1)	30	10	-	20	50	40	20	75
Wild oat (2)	75	15	-	-	-	-	-	-
Windgrass	30	0	-	30	40	50	10	30
Winter Barley	10	0	10	0	30	10	10	10

Table G	COMPOUND	
Rate 8 g/ha	1	2
PREEMERGENCE		
Annual Bluegras	0	0
Blackgrass (2)	0	0
Blk Nightshade	0	0
Chickweed	0	0
Deadnettle	5	0
Downy brome	0	0
Galium (2)	0	0
Green foxtail	0	0
Jointed Goatgra	0	0
Kochia	0	0
Lambsquarters	50	65
LS Canarygrass	0	0
Redroot Pigweed	60	25
Ryegrass	0	0
Scentless Chamo	0	0
Speedwell	20	30
Spring Barley	0	0
Wheat (Spring)	0	0
Wheat (Winter)	-	0
Wild buckwheat	-	0
Wild mustard	0	0
Wild oat (1)	0	0
Windgrass	0	0
Winter Barley	0	0

Table G	COMPOUND					
Rate 4 g/ha	1	2	6	7	9	30
POSTEMERGENCE						
Annual Bluegras	30	-	10	20	10	10
Blackgrass (2)	40	5	10	10	0	10
Blk Nightshade	100	75	30	65	75	70
Chickweed	50	60	50	60	50	70
Deadnettle	100	45	20	20	10	30
Downy brome	20	0	0	10	0	20
Field violet	60	0	30	30	40	40
Galium (2)	30	15	0	20	10	10
Green foxtail	60	60	30	45	45	50
Jointed Goatgra	10	0	0	5	0	20
Kochia	30	-	20	0	10	30
Lambsquarters	60	25	15	70	65	50
LS Canarygrass	55	0	20	30	10	60
Rape	30	-		-	-	-
Redroot Pigweed	50	10	30	30	40	50
Russian Thistle	70	-	0	70	10	50
Ryegrass	5	0	0	0	0	10
Scentless Chamo	55	45	10	50	50	60
Speedwell	40	15	-		-	-
Spring Barley	5	0	0	10	0	5
Sugar beet	100	-	-	-	-	-
Sunflower	50	-	-	-	-	-
Veronica hedera	100	-	30	50	30	50
Wheat (Spring)	5	0	5	30	5	30
Wheat (Winter)	5	0	0	20	0	10
Wild buckwheat	50	0	0	35	0	0
Wild mustard	100	15	15	10	0	60
Wild oat (1)	20	5	10	30	10	30
Wild oat (2)	-	0	-	-	-	-
Windgrass	10	0	0	10	0	20
Winter Barley	10	0	0	10	0	5

Table G	COMPOUND	
Rate 4 g/ha	1	2
PREEMERGENCE		
Annual Bluegras	0	0
Blackgrass (2)	0	0
Blk Nightshade	0	0
Chickweed	0	0
Deadnettle	0	0
Downy brome	0	0
Galium (2)	0	0
Green foxtail	0	0
Jointed Goatgra	0	0
Kochia	0	0
Lambsquarters	35	25
LS Canarygrass	0	0
Redroot Pigweed	0	10
Ryegrass	0	0
Scentless Chamo	0	0
Speedwell	15	15
Spring Barley	0	0
Wheat (Spring)	0	0
Wheat (Winter)	0	0
Wild buckwheat	0	0
Wild mustard	0	0
Wild oat (1)	0	0
Windgrass	0	0
Winter Barley	0	0

TEST H

Seeds, tubers, or plant parts of alexandergrass (*Brachiaria plantaginea*), alfalfa (*Medicago sativa*), bermudagrass (*Cynodon dactylon*), broadleaf signalgrass (*Brachiaria plantyphylla*), common purslane (*Portulaca oleracea*), common ragweed (*Ambrosia elatior*), cotton (*Gossypium hirsutum*), dallisgrass (*Paspalum dilatatum*), goosegrass (*Eleusine indica*), guineagrass (*Panicum maximum*), itchgrass (*Rottboellia exaltata*), johnson grass (*Sorghum halepense*), large crabgrass (*Digitaria sanguinalis*), peanuts (*Arachis hypogaea*), pitted morningglory (*Ipomoea lacunosa*), purple nutsedge (*Cyperus rotundus*), sandbur (*Cenchrus echinatus*), sourgrass (*Trichachne insularis*), surinam grass (*Brachiaria decumbens*) and texas panicum (*Panicum Texas*) were planted into greenhouse pots of flats containing greenhouse planting medium. Plant species were grown grown in separate pots or individual compartments. Preemergence applications were made within one day of planting the seed or plant part. Postemergence applications were applied when the plants were in the two to four leaf stage (three to twenty cm).

Test chemicals were formulated in a non-phytotoxic solvent mixture which included a surfactant and applied preemergence and postemergence to the plants. Untreated control plants and treated plants were placed in the greenhouse and visually evaluated for injury 13 to 21 days after herbicide application. Plant response ratings, summarized in Table H, are based on a 0 to 100 scale where 0 is no injury and 100 is complete control. A dash (-) response means no test result.

Table H	COMPOUND
Rate 1000 g/ha	1
POSTEMERGENCE	
Alexandergrass	-
ADexandergrass	-
Bermudagrass	-
Brdlf Sgnlgrass	-
Cmn Purslane	-
Cmn Ragweed	-
Cotton	-
Dallisgrass	-
Goosegrass	-
Guineagrass	-
Itchgrass	-

Table H	COMPOUND
Rate 1000 g/ha	1
PREEMERGENCE	
Alexandergrass	-
Bermudagrass	-
Brdlf Sgnlgrass	-
Cmn Purslane	-
Cmn Ragweed	-
Cotton	-
Dallisgrass	-
Goosegrass	-
Guinea Grass	-
Guineagrass	-
Itchgrass	-

Johnson grass	-
Large Crabgrass	-
Peanuts	-
Pit Morninglory	-
Purple Nutsedge	-
Sandbur	-
Sourgrass	-
Sugarcane	90
Surinam grass	-

Johnson grass	-
Johnsongrass	-
Large Crabgrass	-
Peanuts	-
Pit Morninglory	-
Purple Nutsedge	-
Sandbur	-
Sourgrass	-
Sugarcane	35
Surinam grass	-

Table H	COMPOUND
Rate 500 g/ha	1
POSTEMERGENCE	
Alexandergrass	-
ADexandergrass	-
Bermudagrass	-
Brdlf Sgnlgrass	-
Cmn Purslane	-
Cmn Ragweed	-
Cotton	-
Dallisgrass	-
Goosegrass	-
Guineagrass	-
Itchgrass	-
Johnson grass	-
Large Crabgrass	-
Peanuts	-
Pit Morninglory	-
Purple Nutsedge	-
Sandbur	-
Sourgrass	-
Sugarcane	80
Surinam grass	-

Table H	COMPOUND
Rate 500 g/ha	1
PREEMERGENCE	
Alexandergrass	-
Bermudagrass	-
Brdlf Sgnlgrass	-
Cmn Purslane	-
Cmn Ragweed	-
Cotton	-
Dallisgrass	-
Goosegrass	-
Guinea Grass	-
Guineagrass	-
Itchgrass	-
Johnson grass	-
Johnsongrass	-
Large Crabgrass	-
Peanuts	-
Pit Morninglory	-
Purple Nutsedge	-
Sandbur	-
Sourgrass	-
Sugarcane	10
Surinam grass	-

Table H	COMPOUND									
Rate 250 g/ha	1	2	3	4	5	6	12	14	24	30
POSTEMERGENCE										
Alexandergrass	100	90	95	95	90	70	75	75	90	85
ADexandergrass	98	-	-	-	-	-	-	-	-	-
Bermudagrass	95	75	85	90	65	65	65	65	70	70
Brdlf Sgnlgrass	100	98	98	100	50	70	70	65	85	80
Cmn Purslane	100	80	65	85	65	35	40	60	0	0
Cmn Ragweed	100	100	95	90	85	70	70	75	75	-
Cotton	100	98	98	98	65	100	95	75	90	98
Dallisgrass	100	90	95	90	65	65	80	80	90	90
Goosegrass	85	40	50	90	65	70	65	20	85	60
Guineagrass	98	80	50	65	75	60	80	80	80	25
Itchgrass	90	-	-	-	80	55	20	75	75	70
Johnson grass	100	98	65	-	75	60	75	70	50	85
Large Crabgrass	100	75	80	80	70	75	65	70	85	98
Peanuts	40	60	50	10	70	40	40	30	20	10
Pit Morninglory	100	80	85	95	75	75	60	50	80	85
Purple Nutsedge	75	75	70	75	20	25	30	65	20	45
Sandbur	100	60	-	50	75	65	75	35	80	70
Sourgrass	90	75	65	70	65	70	50	60	85	75
Sugarcane	80	-	-		-	-	-	-	-	-
Surinam grass	100	90	75	90	80	70	75	75	75	45

Table H	COMPOUND										
Rate 250 g/ha	1	2	3	4	5	6	12	14	16	24	30
PREEMERGENCE											
Alexandergrass	95	98	0	0	100	100	100	100	80	10	100
Bermudagrass	98	100	98	98	100	100	100	100	100	95	100
Brdlf Sgnlgrass	95	100	-	0	90	100	98	98	80	40	98
Cmn Purslane	100	100	95	100	100	100	100	100	100	75	30
Cmn Ragweed	100	100	100	100	-	100	-	-	100	-	100
Cotton	100	10	15	0	30	20	50	90	10	0	98
Dallisgrass	98	100	98	20	100	100	100	100	100	0	100
Goosegrass	80	100	98	98	100	100	100	100	98	100	100
Guinea Grass	-	-	-	-	-	-	-	-	-	-	-
Guineagrass	95	95	20	0	95	100	80	95	80	10	65
Itchgrass	40	50	0	0	0	10	10	30	0	0	25
Johnson grass	85	90	80	70	95	98	95	95	90	35	100
Johnsongrass	-	-	-	-	-	-	-	-	-	-	-
Large Crabgrass	65	100	100	98	100	100	100	100	100	35	98
Peanuts	40	80	5	0	60	35	50	40	0	20	70
Pit Morninglory	80	95	20	35	80	95	85	80	90	70	90
Purple Nutsedge	65	20	5	10	0	30	30	60	10	5	30
Sandbur	100	80	30	50	98	85	98	65	85	0	90
Sourgrass	100	100	100	90	100	100	100	100	100	95	100
Sugarcane	5	-	-	-	-	-	-	-	-	-	-
Surinam grass	100	85	40	5	100	100	100	98	98	10	10

Table H	COMPOUND							
Rate 125 g/ha	1	2	3	4	5	12	14	30
POSTEMERGENCE								
Alexandergrass	100	85	70	75	80	75	75	80
ADexandergrass	-	-	-	-	-	-	-	-
Bermudagrass	95	75	70	90	60	50	65	55
Brdlf Sgnlgrass	100	90	90	90	50	50	65	75
Cmn Purslane	100	75	65	75	50	30	60	0
Cmn Ragweed	100	98	80	95	80	65	80	-
Cotton	100	98	100	80	65	75	85	35
Dallisgrass	100	85	90	85	75	75	80	75
Goosegrass	85	40	30	50	65	20	20	40
Guineagrass	90	75	50	40	80	75	80	20
Itchgrass	90	-	-	-	80	75	70	55
Johnson grass	100	90	65	90	80	75	70	65
Large Crabgrass	95	75	-	80	40	65	70	85
Peanuts	35	10	10	10	-	35	30	10
Pit Morninglory	100	75	85	95	65	30	35	80
Purple Nutsedge	98	75	50	50	0	30	65	25
Sandbur	98	30	10	40	75	10	10	60
Sourgrass	80	75	50	30	65	50	60	75
Sugarcane	-	-	-	-	-	-	-	-
Surinam grass	95	90	50	80	85	75	75	35

Table H	COMPOUND								
Rate 125 g/ha	1	2	3	4	5	6	12	14	16
PREEMERGENCE									
Alexandergrass	95	85	0	0	98	98	90	90	25
Bermudagrass	98	100	80	80	100	100	95	90	98
Brdlf Sgnlgrass	35	75	30	0	80	85	95	50	0
Cmn Purslane	100	80	90	100	100	-	100	100	100
Cmn Ragweed	100	100	100	100	-	100	-	-	100
Cotton	60	0	0	0	30	0	10	50	10
Dallisgrass	95	100	0	0	100	90	95	100	100
Goosegrass	100	100	98	90	100	100	98	100	100
Guinea Grass	-	-	-	-	-	-	-	-	-
Guineagrass	65	90	0	0	85	90	50	40	45
Itchgrass	10	40	0	0	0	0	10	30	0
Johnson grass	75	40	40	0	80	90	0	75	20
Johnsongrass	-	-	-	-	-	-	-	-	-
Large Crabgrass	100	100	90	100	100	100	100	100	98
Peanuts	40	40	0	0	60	30	50	10	0
Pit Morninglory	80	75	35	30	80	95	75	50	80
Purple Nutsedge	0	0	5	5	0	25	30	20	0
Sandbur	85	65	20	0	95	40	50	-	70
Sourgrass	100	100	90	70	100	100	100	100	100
Sugarcane	-	-	-	-	-	-	-	-	-
Surinam grass	98	10	0	0	100	98	90	85	90

Table H	COMPOUND					
Rate 64 g/ha	1	2	3	4	5	30
POSTEMERGENCE						
Alexandergrass	100	85	80	75	80	80
ADexandergrass	-	-	-	-	-	-
Bermudagrass	95	75	40	80	60	45
Brdlf Sgnlgrass	100	85	90	90	50	65
Cmn Purslane	100	75	65	70	50	0
Cmn Ragweed	100	98	60	90	60	-
Cotton	100	98	70	90	65	35
Dallisgrass	100	75	70	70	80	70
Goosegrass	75	40	35	30	65	40
Guineagrass	80	50	-	50	65	0
Itchgrass	100	-	-	-	75	45
Johnson grass	100	75	65	75	80	50
Large Crabgrass	90	60	60	90	40	75
Peanuts	25	5	0	10	60	5
Pit Morninglory	100	60	70	90	65	60
Purple Nutsedge	65	75	10	35	0	20
Sandbur	75	-	0	20	40	40
Sourgrass	95	60	30	35	60	75
Sugarcane	-	-	-	-	-	-
Surinam grass	90	65	30	40	70	35

Table H	COMPOUND							
Rate 64 g/ha	1	2	3	4	5	6	16	30
PREEMERGENCE								
Alexandergrass	90	60	0	0	30	0	0	20
Bermudagrass	98	100	50	75	95	90	85	100
Brdlf Sgnlgrass	0	10	20	0	50	5	0	0
Cmn Purslane	10	60	65	50	100	-	100	0
Cmn Ragweed	100	100	80	100	-	100	100	100
Cotton	20	0	0	0	30	0	0	40
Dallisgrass	80	98	-	0	100	90	85	70
Goosegrass	100	98	50	98	100	98	98	100
Guinea Grass	-	-	-	-	-	-	-	-
Guineagrass	5	85	0	0	10	50	0	0
Itchgrass	0	0	-	0	0	-	0	0
Johnson grass	50	20	0	0	30	20	0	0
Johnsongrass	-	-	-	-	-	-	-	-
Large Crabgrass	50	98	0	50	75	70	98	100
Peanuts	5	20	0	0	60	0	0	0
Pit Morningglory	80	65	0	-	75	80	40	40
Purple Nutsedge	0	0	0	0	0	5	0	0
Sandbur	40	50	0	0	65	0	50	80
Sourgrass	100	100	90	40	100	98	98	100
Sugarcane	-	-	-	-	-	-	-	-
Surinam grass	98	0	0	0	95	20	80	0

Table H	COMPOUND				
Rate 32 g/ha	1	2	3	4	5
POSTEMERGENCE					
Alexandergrass	-	75	75	75	80
ADexandergrass	-	-	-	-	-
Bermudagrass	90	60	40	70	50
Brdlf Sgnlgrass	95	80	40	98	30
Cmn Purslane	95	60	40	65	50
Cmn Ragweed	100	98	75	95	50
Cotton	100	75	90	70	50
Dallisgrass	95	75	40	35	80
Goosegrass	70	30	20	30	65
Guineagrass	75	30	40	20	65
Itchgrass	80	-	-	-	70
Johnson grass	100	65	20	50	70
Large Crabgrass	90	40	35	50	35
Peanuts	25	5	0	10	50
Pit Morninglory	100	-	70	90	35
Purple Nutsedge	65	40	10	10	0
Sandbur	60	-	0	20	50
Sourgrass	80	60	40	30	60
Sugarcane	-	-			-
Surinam grass	80	45	40	60	65

Table H	COMPOUND						
Rate 32 g/ha	1	2	3	4	5	6	16
PREEMERGENCE							
Alexandergrass	20	45	0	0	0	20	0
Bermudagrass	98	75	40	30	50	90	75
Brdlf Sgnlgrass	0	0	0	0	50	0	0
Cmn Purslane	50	40	40	30	100	-	100
Cmn Ragweed	80	80	100	75	-	100	100
Cotton	50	0	0	0	20	0	0
Dallisgrass	65	20	0	0	100	10	0
Goosegrass	25	85	0	90	100	98	90
Guinea Grass	-	-	-	-	-	-	0
Guineagrass	10	60	0	0	10	40	-
Itchgrass	0	0	-	0	0	-	0
Johnson grass	10	0	0	0	0	10	-
Johnsongrass	-	-	-	-	-	-	0
Large Crabgrass	40	75	0	30	70	65	75
Peanuts	0	20	0	0	10	-	0
Pit Morninglory	80	50	-	30	20	75	25
Purple Nutsedge	0	0	0	0	0	0	0
Sandbur	-	0	0	0	50	0	0
Sourgrass	98	100	0	20	100	98	85
Sugarcane	-	-	-	-	-	-	-
Surinam grass	10	0	0	0	40	0	0

Table H	COMPOUND				
Rate 16 g/ha	1	2	3	4	5
POSTEMERGENCE					
Alexandergrass	75	70	50	60	75
ADexandergrass	-	-	-	-	-
Bermudagrass	90	40	10	50	40
Brdlf Sgnlgrass	100	75	20	20	0
Cmn Purslane	98	50	20	60	20
Cmn Ragweed	100	70	70	75	-
Cotton	100	60	70	65	20
Dallisgrass	70	80	20	20	80
Goosegrass	70	30	0	0	40
Guineagrass	50	30	10	5	50
Itchgrass	60	-	-	-	50
Johnson grass	90	35	0	-	60
Large Crabgrass	75	30	5	50	35
Peanuts	5	0	0	10	-
Pit Morninglory	90	30	10	80	35
Purple Nutsedge	98	20	5	5	0
Sandbur	75	20	0	20	20
Sourgrass	75	40	10	20	60
Sugarcane	-	-	-	-	-
Surinam grass	70	45	20	40	50

Table H	COMPOUND				
Rate 16 g/ha	1	2	3	4	5
PREEMERGENCE					
Alexandergrass	0	30	0	0	0
Bermudagrass	35	0	40	30	30
Brdlf Sgnlgrass	0	0	0	0	50
Cmn Purslane	0	0	40	0	80
Cmn Ragweed	50	20	100	20	-
Cotton	-	0	0	0	0
Dallisgrass	5	0	0	0	90
Goosegrass	0	20	0	-	90
Guinea Grass	-	-		-	-
Guineagrass	0	0	0	0	0
Itchgrass	0	0	-	0	0
Johnson grass	0	0	0	0	0
Johnsongrass	-	-	-	-	-
Large Crabgrass	20	0	0	10	30
Peanuts	0	0	0	0	0
Pit Morninglory	50	0	0	0	20
Purple Nutsedge	0	0	0	0	-
Sandbur	-	0	0	0	0
Sourgrass	98	70	0	0	95
Sugarcane	-	-	-	-	-
Surinam grass	20	0	0	0	10

Table H	COMPOUND				
Rate 8 g/ha	1	2	3	4	5
POSTEMERGENCE					
Alexandergrass	-	70	10	5	60
ADexandergrass	-	-	-	-	-
Bermudagrass	80	40	0	35	40
Brdlf Sgnlgrass	75	40	0	0	0
Cmn Purslane	90	25	20	50	20
Cmn Ragweed	95	50	40	10	30
Cotton	100	40	0	5	20
Dallisgrass	50	10	20	10	80
Goosegrass	60	0	0	0	10
Guineagrass	40	20	0	5	20
Itchgrass	30	-	-	-	50
Johnson grass	80	30	0	5	50
Large Crabgrass	75	25	5	35	35
Peanuts	0	0	0	10	30
Pit Morninglory	75	0	-	75	20
Purple Nutsedge	0	20	0	0	0
Sandbur	75	0	0	20	10
Sourgrass	65	20	0	0	30
Sugarcane	-	-	-	-	-
Surinam grass	40	10	0	0	65

Table H	COMPOUND				
Rate 8 g/ha	1	2	3	4	5
PREEMERGENCE					
Alexandergrass	0	20	0	0	0
Bermudagrass	5	0	0	20	0
Brdlf Sgnlgrass	0	0	0	0	10
Cmn Purslane	0	0	30	0	0
Cmn Ragweed	0	0	50	0	-
Cotton	0	0	0	0	0
Dallisgrass	5	0	0	0	20
Goosegrass	0	0	0	0	0
Guinea Grass	-	-	-	-	-
Guineagrass	0	0	0	0	0
Itchgrass	0	0	0	0	0
Johnson grass	0	0	0	0	0
Johnsongrass	-	-	-	-	-
Large Crabgrass	20	0	0	5	30
Peanuts	0	50	0	0	0
Pit Morninglory	80	0	0	0	0
Purple Nutsedge	0	-	0	0	0
Sandbur	-	0	0	0	-
Sourgrass	80	50	0	0	50
Sugarcane	-	-	-	-	-
Surinam grass	0	0	0	0	0

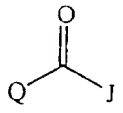
Table H	COMPOUND		
Rate 4 g/ha	1	2	5
POSTEMERGENCE			
Alexandergrass	100	60	60
ADexandergrass	-	-	-
Bermudagrass	75	0	20
Brdlf Sgnlgrass	75	40	0
Cmn Purslane	65	0	0
Cmn Ragweed	80	65	30
Cotton	80	0	20
Dallisgrass	20	0	65
Goosegrass	30	20	0
Guineagrass	10	0	0
Itchgrass	20	-	0
Johnson grass	35	0	20
Large Crabgrass	65	0	20
Peanuts	0	0	30
Pit Morninglory	80	0	20
Purple Nutsedge	0	0	0
Sandbur	35	-	0
Sourgrass	35	10	10
Sugarcane	-	-	-
Surinam grass	50	0	30

Table H	COMPOUND		
Rate 4 g/ha	1	2	5
PREEMERGENCE			
Alexandergrass	0	10	0
Bermudagrass	0	0	0
Brdlf Sgnlgrass	0	0	10
Cmn Purslane	0	0	0
Cmn Ragweed	0	0	-
Cotton	0	0	0
Dallisgrass	0	0	10
Goosegrass	0	0	-
Guinea Grass	-	-	-
Guineagrass	0	0	0
Itchgrass	0	0	0
Johnson grass	0	0	0
Johnsongrass	-	-	-
Large Crabgrass	20	0	30
Peanuts	0	0	0
Pit Morninglory	60	0	0
Purple Nutsedge	0	0	-
Sandbur	-	0	0
Sourgrass	0	20	0
Sugarcane	-	-	-
Surinam grass	0	0	0

CLAIMS

What is claimed is:

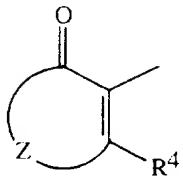
1. A compound selected from Formula I, *N*-oxides and agriculturally-suitable salts thereof,



I

wherein

Q is



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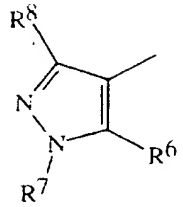

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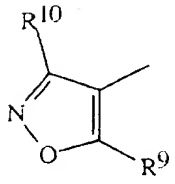
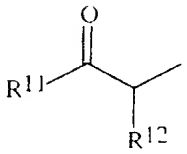


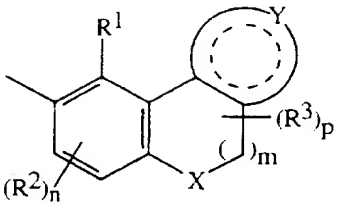
Q-3

or



Q-4

J is



X is O, $S(O)_r$, $N(C_1$-C_2 alkyl) or CH_2 optionally substituted with 1-2 C_1-C_2 alkyl;

Y together with the carbons to which it is attached form a phenyl ring or a fused five or six-membered heterocyclic ring, which may be fully aromatic or

partially or fully saturated, containing 1 to 3 heteroatoms independently selected from the group nitrogen, oxygen, and sulfur, provided that the heterocyclic ring contains no more than 2 oxygens and no more than 2 sulfurs, and the ring is optionally substituted with one to three groups independently selected from the group C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2-C_4 dialkylaminosulfonyl, $NR^{15}R^{16}$, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylcarbonyl, halogen, cyano, nitro, phenyl optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro, and pyridyl optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro, provided that when a nitrogen atom of the fused heterocyclic ring is substituted, then the nitrogen substituent is other than halogen;

Z is selected from the group $-CH_2CH_2CH_2-$, $-OCH_2CH_2-$, -O-CH=CH-, $-NR^{13}CH_2CH_2-$, $-NR^{13}CH=CH-$, $-N=CHCH_2-$, $-OCH_2O-$, $-NR^{13}CH_2NR^{13}-$, $-N=CHNR^{13}-$, $-CH_2OCH_2-$, $-CH_2NR^{13}CH_2-$, $-CH_2S(O)_rCH_2-$, $-CH_2C(O)CH_2-$, $-CH=NCH_2-$, $-CH_2CH_2-$, $-OCH_2-$, $-SCH_2-$, and $-NR^{13}CH_2-$, each group optionally substituted with one to four R^5, and the directionality of the Z linkage is defined such that the moiety depicted on the left side of the linkage is bonded to the carbonyl carbon of Q-1;

R^1 and R^2 are independently H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2-C_4 dialkylaminosulfonyl, halogen, cyano or nitro;

each R^3 is C_1-C_2 alkyl;

R^4 is OR^{14}, SH, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, halogen or $NR^{15}R^{16}$; or R^4 is phenylthio, phenylsulfonyl or $-SCH_2C(O)Ph$, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro;

each R^5 is independently H, C_1-C_3 alkyl, C_3-C_6 alkenyl, C_3-C_6 alkynyl, C_1-C_3 alkoxy, formyl, C_2-C_6 alkoxycarbonyl, $-CH(C_1$-C_3 alkoxy$)_2$, C_1-C_3 alkylthio, C_2-C_4 alkylthioalkyl, cyano or halogen; or when two R^5 are attached to the same carbon atom, then said R^5 pair can be taken together to

form $-OCH_2CH_2O-$, $-OCH_2CH_2CH_2O-$, $-SCH_2CH_2S-$ or $-SCH_2CH_2CH_2S-$, each group optionally substituted with 1-4 CH_3;

R^6 is OR^{14}, SH, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, halogen or $NR^{15}R^{16}$; or R^4 is phenylthio, phenylsulfonyl or $-SCH_2C(O)Ph$, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro;

R^7 is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6 alkenyl, C_3-C_6 alkynyl or $-CH_2CH_2OR^{13}$; or R^7 is phenyl or benzyl, each optionally substituted on the phenyl ring with C_1-C_3 alkyl, halogen, cyano or nitro;

R^8 is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, halogen, cyano or nitro;

R^9 is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6 cycloalkyl or C_3-C_6 halocycloalkyl;

R^{10} is H, C_2-C_6 alkoxycarbonyl, C_2-C_6 haloalkoxycarbonyl, CO_2H or cyano;

R^{11} is C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6 cycloalkyl optionally substituted with 1-4 C_1-C_3 alkyl or C_3-C_6 halocycloalkyl;

R^{12} is cyano, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylcarbonyl, $S(O)_rR^{16}$ or $C(O)NR^{15}R^{16}$;

R^{13} is H or C_1-C_6 alkyl;

R^{14} is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkoxyalkyl, formyl, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, $C(O)NR^{15}R^{16}$, C_1-C_6 alkylsulfonyl or C_1-C_6 haloalkylsulfonyl; or R^{14} is phenyl, benzyl, benzoyl, $-CH_2C(O)$phenyl or phenylsulfonyl, each optionally substituted on the phenyl ring with C_1-C_3 alkyl, halogen, cyano or nitro;

R^{15} is H or C_1-C_6 alkyl;

R^{16} is C_1-C_6 alkyl or C_1-C_6 alkoxy; or

R^{15} and R^{16} can be taken together as $-CH_2CH_2-$, $-CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2CH_2-$ or $-CH_2CH_2OCH_2CH_2-$;

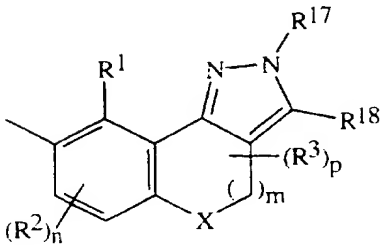
m is 0, 1 or 2;

n is 1 or 2;

p is 0, 1, or 2; and

r is 0, 1 or 2.

2. A compound of Claim 1 wherein J is selected from the group



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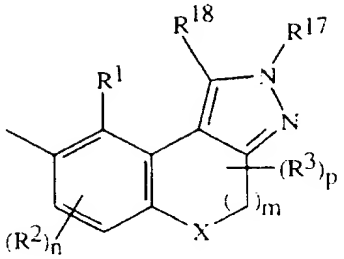

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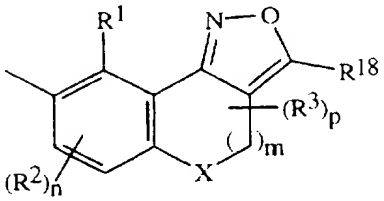

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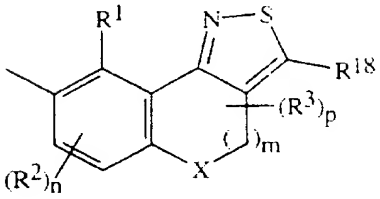

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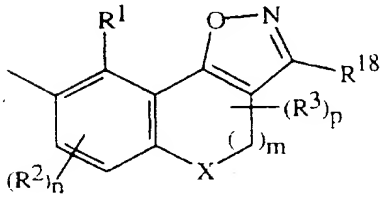

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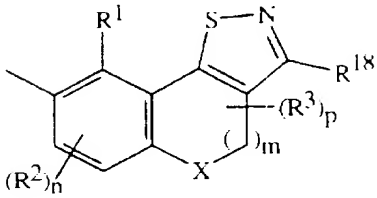

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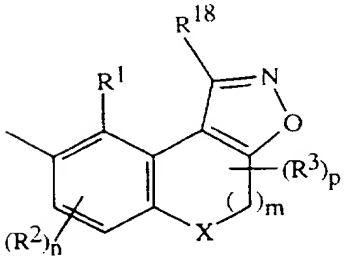

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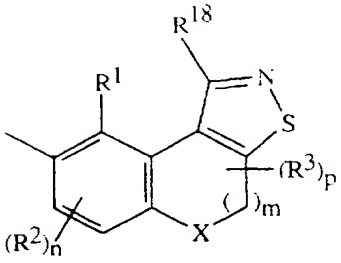

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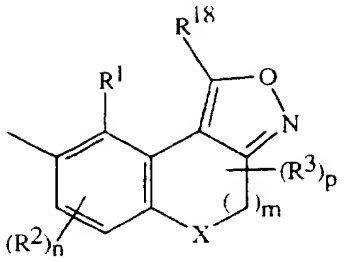

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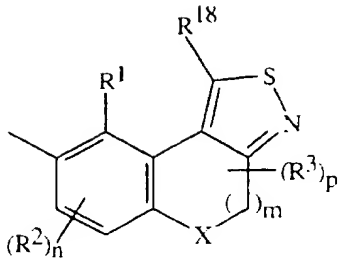

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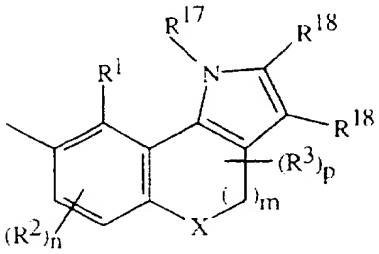

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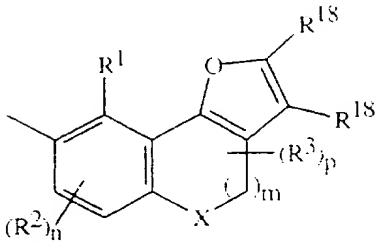

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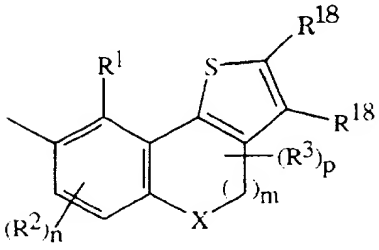

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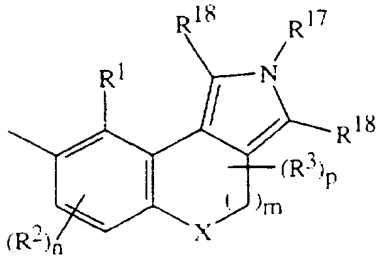

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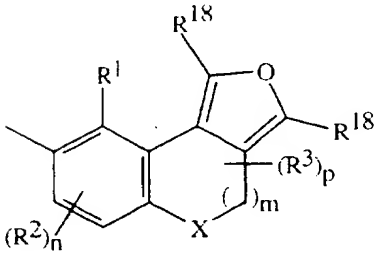

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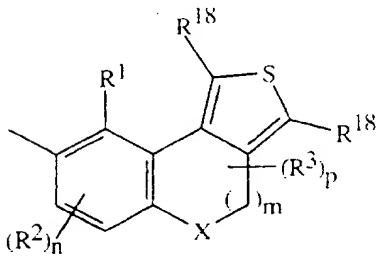

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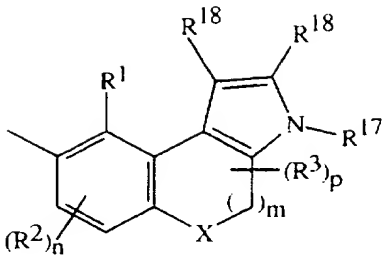

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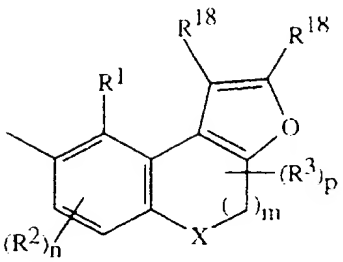

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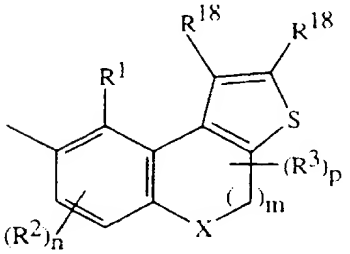

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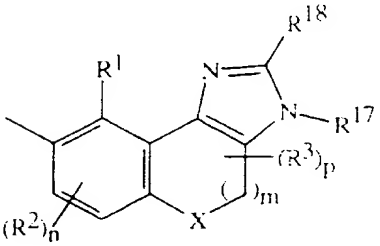

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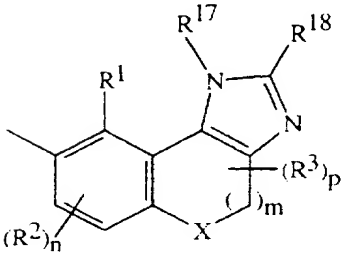

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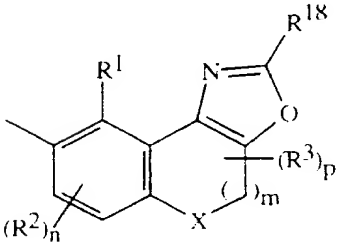

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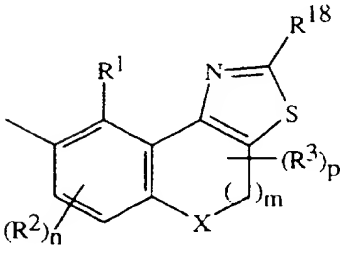

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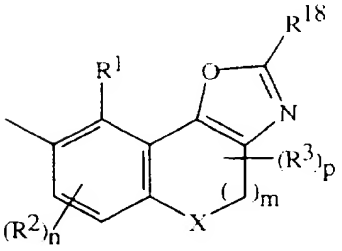

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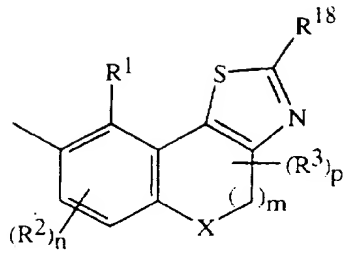

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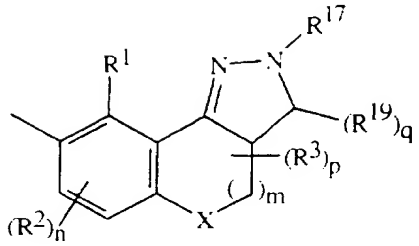

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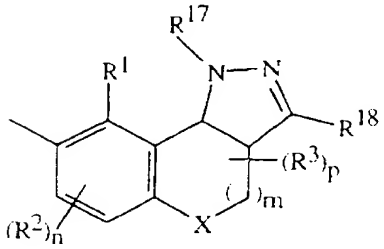
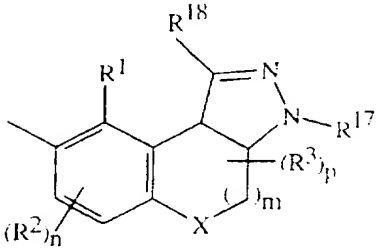
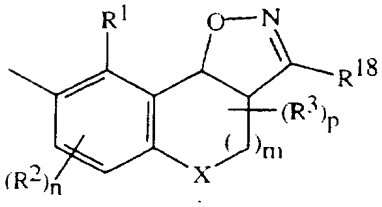


J-27



J-28



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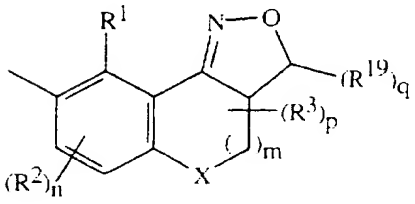

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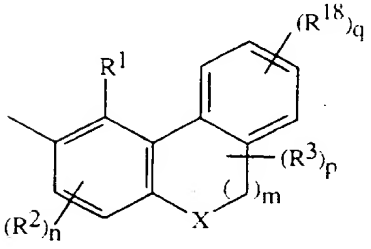

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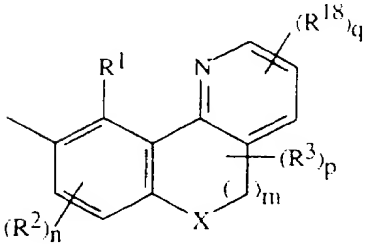

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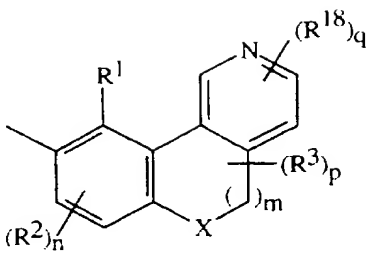

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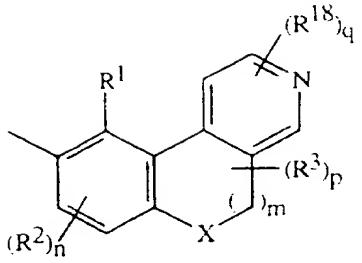
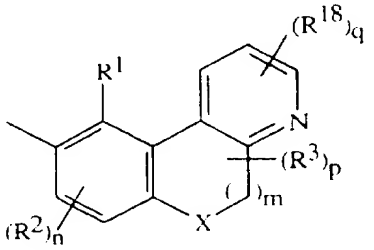
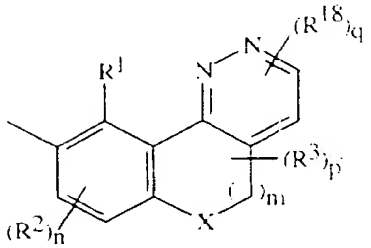


J-34



J-35



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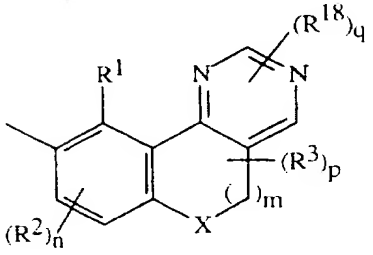

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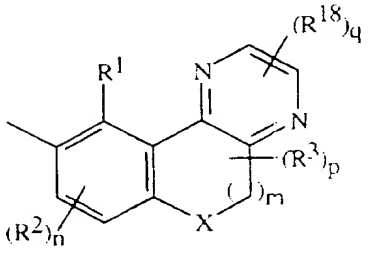
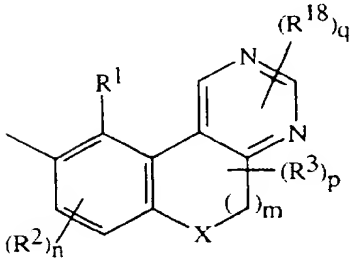
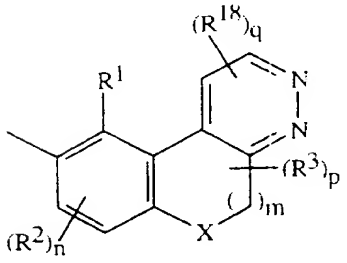


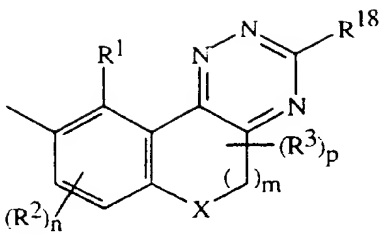
J-38



J-39

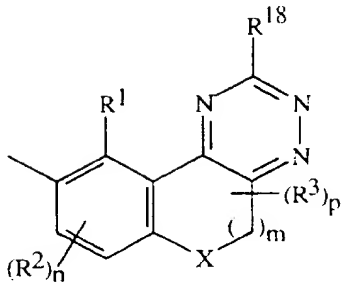


J-40



J-41

and



J-42

R^{17} is H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2–C_4 dialkylaminosulfonyl, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl or C_2-C_6 alkylcarbonyl; or R^{17} is phenyl or pyridyl, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro;

each R^{18} is independently H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkoxy, C_1-C_6 alkylthio, C_1-C_6 haloalkylthio, C_1-C_6 alkylsulfinyl, C_1-C_6 haloalkylsulfinyl, C_1-C_6 alkylsulfonyl, C_1-C_6 haloalkylsulfonyl, aminosulfonyl, C_1-C_2 alkylaminosulfonyl, C_2–C_4 dialkylaminosulfonyl, $NR^{15}R^{16}$, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylcarbonyl, halogen, cyano or nitro;

each R^{19} is independently H, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_2-C_6 alkoxyalkyl, C_2-C_6 alkoxycarbonyl or C_2-C_6 alkylcarbonyl; and

q is 0, 1 or 2.

3. A compound of Claim 2 wherein:

Q is Q-1.

4. A compound of Claim 3 wherein:

Z is $CH_2CH_2CH_2$ optionally substituted with one to four R^5;

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^4 is OR^{14}; and

R^{14} is H or C_1-C_4 alkylsulfonyl; or R^{14} is benzoyl or phenylsulfonyl, each optionally substituted with C_1-C_3 alkyl, halogen, cyano or nitro.

5. A compound of Claim 4 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

6. A compound of Claim 2 wherein:

Q is Q-2.

7. A compound of Claim 6 wherein:

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^6 is H or C_1-C_4 alkylsulfonyl; or R^6 is benzoyl or phenylsulfonyl, each optionally substituted with C_1-C_3 alkyl, halogen, cyano, or nitro;

R^7 is H, C_1-C_6 alkyl, or C_3-C_6 alkenyl; and

R^8 is H.

8. A compound of Claim 7 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

9. A compound of Claim 2 wherein:

Q is Q-3.

10. A compound of Claim 9 wherein:

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^9 is H, C_1-C_3 alkyl, or cyclopropyl; and

R^{10} is H or C_2-C_3 alkoxycarbonyl.

11. A compound of Claim 10 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

12. A compound of Claim 2 wherein:

Q is Q-4.

13. A compound of Claim 12 wherein:

R^1 and R^2 are independently H, C_1-C_3 alkyl, C_1-C_3 alkoxy, halogen or nitro;

R^{11} is C_3-C_6 cycloalkyl or C_3-C_6 halocycloalkyl, each optionally substituted with 1-4 C_1-C_3 alkyl; and

R^{12} is cyano or C_2-C_6 alkoxycarbonyl.

14. A compound of Claim 13 wherein:

X is $S(O)_r$;

m is 1 or 2; and

r is 2.

15. The compound of Claim 1 which is selected from the group:

a) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide;

b) 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide;

c) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide;

d) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S*,*S*-dioxide;

e) 2-[(3-chloro-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide;

f) 2-[(4,5-dihydro-2,7,10-trimethyl-2*H*[1]benzothiepino[5,4-*c*]pyrazol-9-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide;

g) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide monosodium salt;

h) 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide monosodium salt;

i) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide monosodium salt;

j) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S*,*S*-dioxide monosodium salt;

k) 2-[(3-chloro-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide monosodium salt;

l) 2-[(4,5-dihydro-2,7,10-trimethyl-2*H*[1]benzothiepino[5,4-*c*]pyrazol-9-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide monosodium salt;

m) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide monopotassium salt;

n) 2-[(2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide monopotassium salt;

o) 2-[(2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide monopotassium salt;

p) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)(1-ethyl-5-hydroxy-1*H*-pyrazol-4-yl)methanone *S*,*S*-dioxide monopotassium salt;

q) 2-[(3-chloro-2-ethyl-2,4-dihydro-6,9-dimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)carbonyl]-1,3-cyclohexanedione *S*,*S*-dioxide monopotassium salt;

r) 2-[(4,5-dihydro-2,7,10-trimethyl-2*H*[1]benzothiepino[5,4-*c*]pyrazol-9-yl)carbonyl]-5-methyl-1,3-cyclohexanedione *S*,*S*-dioxide monopotassium salt;

s) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)[1-ethyl-5-[(methylsulfonyl)oxy]-1*H*-pyrazol-4-yl] methanone *S*,*S*-dioxide; and

t) (2,4-dihydro-2,6,9-trimethyl[1]benzothiopyrano[4,3-*c*]pyrazol-8-yl)[1-ethyl-5-[(4-methylphenyl)sulfonyloxy]-1*H*-pyrazol-4-yl] methanone *S*,*S*-dioxide.

16. A mixture comprising a herbicidally effective amount of a compound of Claim 15 with a herbicidally effective amount of one or more compounds selected from tribenuron-methyl, thifensulfuron-methyl, metsulfuron-methyl, chlorsulfuron, triasulfuron, 2,4-D, dicamba, bromoxynil, MCPA, fluroxypyr, clopyralid, fenoxaprop, diclofop, tralkoxydim, clodinafop, imazamethabenz, sulfosulfuron, difenzoquat, propanil, prosulfuron, metribuzin, glyphosate, triallate, trifluralin, paraquat, diallate, linuron, diflufenican, pendimethalin, cyanazine, neburon, terbutryn, prosulfocarb, isoproturon, chlortoluron, methabenzthiazuron, metoxuron, simazine, ioxynil, mecoprop, metosulam, fluroglycophen-ethyl, flamprop-M-isopropyl, benzoylpropethyl, ethametsulfuron-methyl, quinclorac, bentazone, rimsulfuron, nicosulfuron, primisulfuron, atrazine, terbuthylazine, imazethapyr, glyphosate-trimesium, glufosinate, fluthiacet-methyl, quizalofop-P-ethyl, flumetsulam, halosulfuron, sethoxydim, and flumiclorac-pentyl.

17. A herbicidal composition comprising a herbicidally effective amount of a compound of Claim 1 and at least one of a surfactant, a solid diluent or a liquid diluent.

18. A herbicidal composition comprising a herbicidally effective amount of a mixture of Claim 16 and at least one of a surfactant, a solid diluent or a liquid diluent.

19. A method for controlling the growth of undesired vegetation comprising contacting the vegetation or its environment with a herbicidally effective amount of a compound of Claim 1.

20. A method for controlling the growth of undesired vegetation comprising contacting the vegetation or its environment with a herbicidally effective amount of a mixture of Claim 16.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 96/18381

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C07D495/04 C07D498/04 C07D231/54 C07D335/10 A01N43/90
A01N43/52 A01N43/18 //(C07D495/04,335:00,231:00),
(C07D498/04,335:00,261:00),(C07D495/04,335:00,239:00),

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C07D A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 341 552 A (CORNELL) 12 September 1967 see column 1, line 63 - column 2, line 2; claim 1 -----	1,17

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

1

Date of the actual completion of the international search
15 April 1997

Date of mailing of the international search report
21.04.97

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
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Fax (+ 31-70) 340-3016

Authorized officer
Alfaro Faus, I

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNA NAL SEARCH REPORT

Int[redacted]nal Application No
PCT/US 96/18381

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 (C07D495/04,335:00,221:00),(C07D495/04,337:00,231:00), (C07D495/04,335:00,333:00)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.

☐ Further documents are listed in the continuation of box C.

☐ Patent family members are listed in annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

ternational application No.
PCT/US 96/ 18381

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see next sheet

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searches without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 96/ 18381

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

On grounds of Articles 6 and 17.2(ii) of the PCT (conciseness of claims) and of the Guidelines for Examination in the EPO, Part B, Chapter III, 2.2 (economic reasons) the search has been restricted to a generalization of the preparation examples disclosed in the description.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter[illegible]nal Application No
PC[illegible]/US 96/18381

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3341552 A	12-09-67	US 3397271 A	13-08-68